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HISTORICAL SURGERY.

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# HISTORICAL SURGERY,

OR

THE PROGRESS OF THE

## *SCIENCE OF MEDICINE:*

ON

INFLAMMATION, MORTIFICATION,

AND

GUN-SHOT WOUNDS.

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BY JOHN HUNT.

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M.DCCC.I.

ENTERED AT STATIONERS' HALL.

# P R E F A C E.

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THE mechanism of animal life forms a distinct system of philosophy, to which the laws that regulate the operations of inanimate matter are in many respects inapplicable; and yet a knowledge of experimental philosophy is so intimately connected with the study of anatomy, that the structure and operations of the different parts of the animal body cannot be well explained without it. To distinguish in what instances these two branches of science may with propriety be connected with each other, requires an extent of information, and accuracy of judgement, that is not frequently to be met with; and I presume the following pages will bear ample testimony to the truth of this assertion.

Those, who wish to succeed in the study of philosophy, should acquire a knowledge of the experimental part in early  
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youth, which may not only be considered a pleasing amusement, but will in general prove a fruitful source of useful information. It presents a view of the instrumental parts of philosophy to the external senses, and prepares the mind for a more perfect knowledge of the respective subjects to which the experimental exhibitions may apply. The mind is capable of understanding the construction and use of instruments long before the subjects, which the experiments are intended to investigate, would be intelligible; and thus, by making the first a subject of amusement, the way is prepared for more important information.

But what is still an argument of much more importance, I am well convinced, that, if a knowledge of mechanism and the experimental part of philosophy is not acquired at an early age, it is seldom obtained afterwards. At a more advanced period towards maturity, the instrumental part is either thought to be beneath their notice, or indolence prevents that  
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degree of attention which is necessary for the acquirement of even a tolerable knowledge of this part of the subject. It rarely happens that a knowledge of both arts and sciences is acquired by the same person ; but without this coincidence the medical character must be very imperfect ; and for the purpose of forming an accomplished teacher of any branch of the science of medicine the united powers of both are indispensable.

At a time when I was inexperienced in the world, when every fresh avenue of thought presented perfection in perspective, and when I had flattered myself with the expectation of seeing philosophy preside over the different branches of the profession, I cannot express how much I was disappointed, when the first subject that engaged my attention was an attempt to examine the blood in the microscope ; when, instead of meeting with any satisfactory information, I was astonished to find that the parties were unacquainted with  
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the use of the instrument. A knowledge of experimental philosophy, and the necessary apparatus, is certainly very easily to be obtained; but, if we converse with those who are considered men of learning, we shall frequently find that it is a subject with which they are unacquainted, and sometimes represented as beneath their notice; instead of appealing to the evidence of nature, they depend alone on the opinion of their predecessors; and scientific demonstration is supposed to supersede the necessity of experimental investigation. And with these pedants in philosophy we also find, that a very imperfect acquaintance with only the rudiments of science is too often admitted as an adequate apology for the want of every other species of useful information\*. The philosophy of literature depends alone on precedent and book authority; but he, who would wish to obtain a knowledge of animal nature, must read with sceptic eyes, and never admit any fact as truth which he has not repeatedly

\* Full in the midst of Euclid dip at once,  
And petrify a Genius to a Dunce. POPE.



## PREFACE.

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examined with the most critical attention; for credulity and ignorance must ever be considered as inseparable companions. In the study of anatomy, which is the basis of the science of medicine, there is more information necessary than books alone can furnish; and philosophical experiments require a degree of accuracy and attention that is rarely to be met with. In addition to a perfect knowledge of the instruments that are made use of, a certain dexterity is necessary in the execution, which is only to be obtained by habitual industry and long experience. There is much less difficulty in repeating experiments that have been made before, than in conducting new ones with advantage and success; yet without the former we must take the assertions of others upon trust; and if the subject is not yet exhausted, new experiments will be necessary.

I do not presume to assert that there are not numbers of good practical surgeons, whose reputation stands high

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in the esteem of the public, although they may be very little acquainted either with natural or experimental philosophy. But whatever may be the public opinion on this subject, I shall still contend that the art and science of surgery would be very imperfect without them.

Natural philosophy appears to me to be one of the first principles of the science of medicine; and the art of surgery is so intimately connected with a knowledge of mechanics, which is a very important branch of experimental philosophy, that surgery in the abstract must be looked upon as one of the mechanic arts. The instrumental part of surgery is a very important subject, the facility of performing some of the most difficult operations depends in some degree on the perfection of the instruments; and, on this occasion, a knowledge both of anatomy and mechanics, is essentially necessary; the one to direct our judgment respecting the nature of the operation, the other for determining the

the best method of performing it. In cases of fractures and dislocations, a variety of instruments has been thought necessary; and I believe no part of surgery has been more incumbered with a profusion of useless inventions. In Mr. Gooch's second volume we meet with a great variety of this kind of instruments; but Mr. Pott contributed much more to the improvement of surgery, by pointing out the most advantageous position of a fractured limb, than all these instrumental Genii put together. What particularly recommends this subject to our attention is, the notice that is taken of these instruments by Mr. Bell, who has given exact copies of Mr. Gooch's plates in his system of surgery, in consequence of which a number of useless inventions is recommended to public attention, which without this revivification would for ever have passed unnoticed.

The want of attention to the mechanism of nature is the original cause of all these practical imperfections; but the  
science



science of surgery includes a much more extensive field, and the theories both of the practice of physic and surgery are inseparably connected with each other. If it is thought probable that a physician can understand the mechanism of animal nature without a previous knowledge of the first principles or laws of mechanics, we may then conclude that philosophy and medicine have no connection with each other. But I believe that few will contend that the complicated laws of organic life are less difficult of investigation than the mechanic powers of inanimate matter; I shall therefore infer, that, when the practice of physic and surgery does not depend upon a philosophical basis, it degenerates into the most irrational and contemptible empiricism.

But I shall now presume a little further, and direct our views to what some may consider a higher order, proceeding from surgery to physic, from mechanics to  
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the scientific branches of philosophy. The former I consider as the experimental apparatus, the instruments of inquiry, the powers by which the secret operations of nature are disclosed; the latter comprehends the arrangement of facts already known, and the investigation of corresponding phenomena by analogy and deduction.

And even here we shall meet with equal imperfections. They are not little objects that will now engage our attention; the mysterious functions of animal nature, and the mechanism of the universe, will here become the subjects of our contemplation. These may certainly be classed with the sublime and beautiful; and that we may meet with a writer equal to the subject, I shall refer to one about a century back, when literature shone forth with full meridian splendour. The only author I shall notice is Doctor Mead, who as a writer must certainly command respect, and who was without doubt possessed of considerable literary accomplishments

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plishments; but here we come to the point in question, which I hope by the evidence of this example to explain.

He wrote a book, in latin, on the influence of the sun and moon on the human body;\* which is certainly a learned subject, and in a learned language; and if his knowledge of the animal œconomy had been equal to his learning, the book would have been more worthy of our attention. He rests his arguments on a quotation from Sir Isaac Newton's† theory of the tides; but the analogy is not consistent, the two subjects having no more resemblance to each other than the human body has to the terraqueous globe. In debating this subject I have been frequently asked, and the question may be again repeated, if the sun and moon have such influence on the waters of the ocean, will they not produce similar effects on the fluids of the animal body? On this occasion it will be necessary to recollect,

\* Mead de imperio Solis ac Lunæ in corpora humana p. 10 et 11.

† Newton's Principia Lib. iii. prop. 36 et 37.

that



that the sun and moon attract the earth as well as the seas ; but the earth being solid does not change its form to meet the attracting powers ; and the waters of the ocean and the fluids of the animal body differ so much with respect to their situation, that the same cause cannot produce the same effect in both instances.

The waters of the ocean flow at liberty on the surface, and move in obedience to the combined influence of attraction and centrifugal power ; but the fluids of the animal body are all surrounded with, and confined in, their proper vessels ; and consequently, if they were subject to the same external influence, still it would be impossible that they should ebb or flow correspondent to the tides. The attraction of the sun and moon operate both on the solids and fluids of the animal body, and diminish the gravity of the whole in proportion to their attractive power, and the centrifugal power will operate on both in a similar direction ;  
but

but the respective situation both of the solids and fluids to each other will remain the same.

It is not on small bodies placed on the surface of the earth that their influence is perceptible, it is only on the ocean that this phenomenon takes place; though the scale is extensive, and the quantity immense, an exact balance is preserved, and the whole is suspended in equilibrio by corresponding powers. In the Mediterranean sea there are no tides; like a ponderous bulk, in a single scale without a counterpoise, it remains at rest. If the Mediterranean communicated with the ocean by a large subterraneous passage, this sea would partake of the general equilibrium; and the want of tides in this vast body of water will furnish us with an answer to some of the most important queries that have been started on this subject. Much has been said about the current through the straits of Gibraltar, and many conjectures formed in explanation; some have supposed

supposed that the water passes out of the Mediterranean by a subterraneous passage, whilst others have attempted to estimate the exhalation, and have concluded that the quantity exhaled was equal to the supply which pours in through the straits and other large and numerous sources. I shall not attempt to prove that the Mediterranean does not communicate with other seas; but it certainly must be evident, that the communication is not of sufficient magnitude to preserve an equilibrium, as this sea does not partake of the influence of the tides.

I cannot, on this occasion, resist the temptation of noticing an observation\* of Mr. Tooke's respecting the Caspian sea, which we meet with in his view of the Russian empire. In order to account for the consumption being equal to the supply, from the different rivers which empty themselves into this sea, he supposes that there is a constant drain

\* Tooke's view of the Russian Empire, vol. 1, page 238.



through a porous and sandy bottom. He says, "Perhaps the true reason of this sea remaining equally full is to be sought in the quality of its bottom; which consists, not of a thick slime, but of a shell-sand, the particles whereof touching but in a few points, it is consequently very porous; of the same substance the whole shore is likewise found. Layer upon layer it lies three fathoms deep. This indeed lets the fresh water through, but it becomes immediately salt again by the salt water pressing on it; through this sand then the water is filtered and falls into the abyss beneath, in the same quantity as it flows into the sea."

In the first place, it must appear evident that we have no method of ascertaining the fact; and the whole must at best depend upon conjecture. Whereas, the quantity of exhalation might be estimated with some degree of probability by experiment; and if this is sufficient to account for the consumption, it would then not be necessary to dive to the  
bottom

bottom in search of imaginary outlets; and if we consult what has been said by former writers on this subject, we shall find we have no need of a pretended communication between this and the ocean for accounting why it rises no higher: But may rather wonder why it continues so full, considering its vast extent, and how much water is evaporated by the sun, and brushed off by the winds\*. But waving all these collateral considerations, the Caspian sea has no tides, which is the only circumstance that is particularly applicable to our present purpose.

The tides of the atmosphere do not influence its gravity, or produce any perceptible effects in the state of the air on the surface of the earth; so that, whatever effect the sun and moon may have on the animal body, it is not connected with the theory of the tides. It is such a misapplication of philosophical illustration to other subjects which have no

\* Vid. Dictionary of the World, by Brookes & Collyer.

analogy in nature, as for ages has incumbered the improvement of the science of medicine; and similar instances of false analogy are almost innumerable. But whenever they occur, they betray a want of general information, and a partial and imperfect knowledge of the subject. If Doctor Mead had critically examined both sides of the question, he would have foreseen the fallacy of his argument: the animal body forms a system within itself, the attraction of gravitation is the connecting principle of the universe.

I do not mean to say that the sun and moon have no influence on the animal body; I only wish to shew that Doctor Mead has not adopted a proper method of ascertaining either its nature or extent; for if we cannot discover the effects of the sun and moon on fluids less confined, it is less probable, that we should ascertain their influence on the fluids of the animal body. I know no instance  
where



where a fluid is placed more at liberty to the influence of any attracting power than a column of mercury suspended in a barometer; and over this the sun and moon both pass unnoticed. If we attempt to ascertain the influence of the sun and moon on any given quantity of water, from a single drop to the whole contents of the Mediterranean, it cannot be discovered by experiment; it is the ocean alone that obeys the power, the tides of which are only to be weighed by the great scale of the universe; and this exhibits a sublime view of the mechanism of nature, and gives a striking example of the grand equilibrium of the world.

With respect to the liberty of discussing any opinion that is presented to the public, it is a right that must continue so long as a work is considered worthy of attention; the privilege cannot be limited to the life of the author, as books of merit will live for ages, when the writers are no more. Antiquity certainly stamps a value on literary productions,

but no consideration whatever should induce one age to examine, with blind credulity, the opinions of former periods. Every one, who gives his opinion to the public, offers himself as a candidate for public applause, which is the united voice of individual approbation; and wherever an individual has a right to approve, he has a right to disapprove, and public justice demands that that judgment should be impartially executed.

The attempts, which have been already made to investigate the first principles of the practice of physic and surgery, are so numerous, that, if the subject would admit of demonstration, we should not at this day be incumbered with such a diversity of opinion. I am not so presumptuous as to suppose, that the following pages will conduct the science of surgery to that state of perfection so devoutly to be wished; being as truly conscious of the narrow limits of my own abilities, as I am well convinced of the boundless extent of the subject.

It is the business of human life to search after perfection, although the object is not within our reach; we can only take a partial view of the works of nature, whose secret operations exceed the penetration of the human mind. The subject before us is not a temple made with hands; but it is the work of infinite wisdom, whose judgments are unsearchable, "and his ways past finding out".





# ERRATA.

- Page 69, line 5, for *affected* read *effected*.  
 75, — 7, for *Boerhave* read *Boerhaave*.  
 135, — 23, for *comencement* read *commencement*.  
 153, — 15, for *or* read *of*.  
 241, — 5, for *analagous* read *analogous*.  
 281, — for *Cullen*, vol. 14, read *Cullen's practice of physic*, vol. 4.  
 315, — 4, for *Mackbride* read *Macbride*.  
 328, — 2, for *genious* read *genius*.  
 406, — 20, for *satisfacōēn* read *satisfaction*.  
 in page 401, 402, 403, 404, et 405, read *The operative part of surgery*.

## SECTION I.

### THE IMPERFECTIONS OF THE TREATMENT OF MORTIFICATION EXEMPLIFIED, BY THE INDIS- CRIMINATE USE OF THE BARK AT IMPROPER PERIODS OF THE DISEASE.



THE successful treatment of gangrene, sphacelus, or mortification, is mentioned with such unlimited confidence both in books and conversation, that it may at first view be considered presumptuous to question the validity of the general opinion.

We frequently hear of instances of curing mortification, as if it was a business very easy to accomplish: and what is still more extraordinary, some of the first writers on the subject express themselves as if it was a settled point in the practice of surgery; and yet, with all their boasted certainty of success, I have never met with any rational system of practice that, in my opinion, was likely to prove efficacious.

When the leading object of any critical discussion is to search for truth, not a doubt can arise respecting the propriety of the inquiry; and as every one, who addresses the public, undoubtedly expects some degree of attention in return; it is certainly a mark of respect to examine a book,

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though in the result there may be little to approve. Implicit submission to the dictates of any author can never lead the way to scientific information, and the necessity of attentive investigation will increase, in proportion to the extent, and intricacy of the subject; it is the reader's business to examine the whole evidence that lies before him, to try the question by the immutable principles of nature, and ultimately to form an opinion for himself. As for those who are not capable of critically examining what they read, they may as well sit still, and not attempt to read at all; for he, that is not capable of forming an opinion for himself, must ever remain in a state of doubt and uncertainty, and the last book that he reads, will probably prove the limited source of his information, the basis of his theory, and his guide in practice.

If I had not the authority of written evidence to refer to, I should not hazard an opinion, or attempt to prove the imperfect state of the subject before us; and in what degree the opinion of the present time may coincide, is a question of such delicacy, that I shall not take upon myself to determine. It is reasonable to conclude, that the writings of the first professional characters will have considerable influence on the public opinion, and though we may meet with many exceptions, this must be considered the most certain standard to which we can appeal.

I shall for this purpose first solicit the reader's attention to Mr. Bromfeild's chirurgical observations. This celebrated author had his share of reputation, and was in his time looked up to, as one at the head of his profession; for which reason I consider his writings more fit for my present purpose; as I do not wish to notice any but such as the public have been accustomed to look up to with respect.

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If we look for authority, that before us is unquestionable, and in every other respect the contents are particularly adapted to the present occasion; indeed the inaccuracies are so flagrant, that candour forbids us to estimate his professional merit by the same scale, that we should measure the extent of his abilities as a writer. But before we proceed to examine the work in a professional view, I shall beg leave to notice some few imperfections of a more familiar kind, that the reader may not be alarmed at the inconsistency of his speculative doctrines, and the general deficiency of systematic argument.

In the first page the ancients are highly complimented as the authors of the "general principles of surgery, and the inventors of every improvement now in use;" and in the very next page, he attributes all improvements to the moderns, observing that "what was formerly pursued only by a few and that with languor and disgust, is now sought after by most with vigour and curiosity;" and thus, his old friends seem soon to have lost his good opinion; for if the ancients pursued the art with such languor and disgust, it is not likely that they should have made the great discoveries for which, Mr. Bromfield says, we are so much indebted to them.

But if we pursue the argument a little further, we shall find that he expresses himself in plainer language; all regard for antiquity is set aside, and the sacred memory of our forefathers treated with less civility and respect; for the moderns are severely censured, "who in this enlightened age still dote on antiquity, and copy devoutly the absurdities of their predecessors."

To me this admonition has proved a very useful lesson, and I hope it  
will

will prove equally instructive to many others, as it has effectually protected me from that blind credulity, with which I might otherwise have perused this celebrated performance. Whether we are most indebted to the ancients or moderns is a question left undetermined; our learned author either seems disposed to please both parties, or perhaps was not himself sufficiently informed to give a decided opinion on the subject.

It is rather an unpleasant task to examine a book where there is so little to approve, but I shall not sacrifice the salutary object I have in view to motives of false delicacy; it is my wish to examine the present state of this subject, and if the public opinion bears any resemblance to that before us, or if we only meet with a few instances of coincidence, it is still necessary that these imperfections should be explained.

The preceding example of our author's style, and manner of conducting an argument will be sufficient for our present purpose; I shall therefore now proceed to examine his observations on mortifications. He says "It is well known, that whenever any part has had the *least tendency* to mortification, the bark has, of late years, been indiscriminately given in very large quantities, as the *only* specific to stop its progress; and so sanguine are many in this prejudice, that they do not believe any mischief can possibly ensue from the use of this medicine\*." The conclusion of this sentence appears to intimate some kind of danger that is not generally understood, and may be supposed to depend either on the impropriety of this medicine as a remedy in such cases, or the want of abilities to discriminate in what manner, and at what period of the disease, it ought to be administered.

\* See Mr. Bromfield's surgical cases page 129.

In the first instance an early stage is particularly alluded to, by the *least tendency* being printed in italics, as if it was intended to command our particular attention, yet, notwithstanding all this typographical illustration, the general meaning still remains obscure; for if by tendency to mortification, we are to understand that the disease, whether the consequence of external injury or from any other cause, is inflammation, and of that degree that there is reason to apprehend a mortification; if the bark should be given under such circumstances, it would certainly be improper: and if by tendency to mortification, that state of disease is alluded to, when the inflammatory symptoms begin to subside, and the powers of nature to sink below that standard, which is necessary to the support of animal life, on this occasion the bark will be pointedly indicated; and consequently every insinuation to the contrary, must be considered highly irrational.

If then for want of discriminating between these two very different stages of disease, the bark is sometimes given as a preventative of mortification (that is before it does take place,) and at other times as a cure for mortification (viz. when it has taken place;) then, without doubt, the bark with strict propriety may be said to be given indiscriminately.

In the first instance our attention is directed to a very early stage of the disease; but we have then to reconcile the least tendency to mortification with the real existence of the disease; for as the bark is said to be given "as the *only* specific to stop the progress of mortification," this is fully admitting the mortification to have taken place; as it must necessarily exist before we can speak with propriety of stopping its progress; the two periods are each distinctly mentioned in the same sentence, and the use of the bark in both instances represented as a vulgar prejudice.

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Though confidence in this medicine is called prejudice, yet we are immediately told that "this partiality is very excusable, as there can be no doubt but that the high opinion they entertain of it, in such cases, must be founded on experience, as probably some very extraordinary and unexpected cures have been performed, where the bark was the chief remedy employed."

Let me here ask what more rational evidence of the salutary powers of a medicine can be thought requisite, than the experience of very extraordinary and unexpected cures; but does this experience coincide with his own, and does what he has observed in practice authorize this conclusion? Has he met with instances in his own practice, where the bark has performed extraordinary and unexpected cures, and does his own experience convince him of its efficacy? Unexpected cures they must be, to one who does not believe in the efficacy of the remedies made use of; but if the powers of a medicine are doubtful and not to be depended upon, why make use of them at all, or if this is not the only remedy, some other method of treatment more likely to prove efficacious should have been pointed out.

The whole of this discussion is certainly so far unfavourable to the bark as a remedy in mortifications; our next object will be to examine what is said on the opposite side of the question. The description that I shall for this purpose refer to is not a case of mortification, but a state of disease, the consequence of inflammation, that is nearly approaching to it; it is that state of disease when inflammation having subsided and suppuration taken place, the energy of nature seems to have been so nearly exhausted, as to mark one degree of debility short of mortification.

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Our author says, "I believe, when things were brought *to this point*, and the discharge was extremely thin, and greatly too much in quantity, that had I not given the bark *freely*, I should have lost my patients; but under such circumstances they must be blind indeed who will not acknowledge its superior efficacy to any other medicine known to us at this time." Thus we find his opinion evidently changed, and having once acknowledged the salutary powers of the bark in one instance of debility, a regular series of conviction seems immediately to take place, and the same remedy is recommended in all the different stages of sphacelus, and mortification.

For my own part I shall not presume to determine which side of the question is best supported, I only wish the reader to observe that he at one time censures what he afterwards approves; in a tendency to mortification the use of the bark is represented as a vulgar error, but in a tendency to sphacelus, we are informed that the bark may not be improper.

This inaccuracy of argument has been already noticed, and a proper distinction between a tendency and real existence pointed out; it is an ambiguity of expression that every one, who understands himself and wishes to be understood by others, would never make use of; it is a species of language that sinks beneath the dignity of philosophy, and can only be considered as a cloak for ignorance, or made use of for the purpose of disguising deceit.

With respect to the succeeding part of the same sentence, it will be difficult to determine whether the ambiguity depends on verbal inaccuracy  
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or is the result of an imperfect knowledge of the subject. He says "after a confirmed *sphacelus*, when the patient, by the necessary evacuations made to prevent an increase of inflammation, has been considerably reduced, the blood greatly attenuated, the mortification seemingly stopped, the diseased parts begin to separate, and a thin discharge, and great in quantity, follows; in these circumstances, the bark itself should be given as frequently as the stomach will bear it, in such form as will best agree with the constitution \*."

If Mr. Bromfeild wished to be understood as speaking of the inflammation that preceded the *sphacelus*, he certainly would have said by the necessary evacuations that were made use of to prevent an increase of the previous inflammation; but as it now stands we must consider both the inflammation and the necessary evacuations as subsequent occurrences; in this point of view, and this only, we must understand the whole of this discussion. But will experience authorize the supposition, or do the laws of animal nature admit the possibility, that inflammation should succeed to *sphacelus* in such kind or degree as to render evacuations necessary?

In the same sentence, the termination of mortification is mentioned and the commencement of digestion described as a salutary consequence of the evacuating system, and then a state of debility is supposed to take place, in which the bark is recommended to be given in full and frequent doses.

But in the different stages of the disease from the commencement of in-

\* See Mr. Bromfeild's surgical cases page 131.

flammation



Inflammation to the termination of mortification, which are here crowded together without proper precedency or distinction, the bark is never mentioned, and evacuations seem to be the only remedies; but when "the mortification is seemingly stopped, the diseased parts begin to separate, and a thin discharge and great in quantity follows; in these circumstances, he observes, the bark should be given as frequently as the stomach will bear it." The first part of these observations presents us with some obscure insinuations against the propriety of giving the bark in cases of mortification, and yet the bark is recommended in cases of debility, to support the energy of the system and promote suppuration; but, at the same time that he seems to doubt its efficacy, he has not sufficient confidence in his own opinion to express himself in plain intelligible language.

To those, who have attentively read Mr. Sharp's opinion respecting the bark as a remedy in mortifications, it must appear very singular that Mr. Bromfeild and many other writers should pretend to discuss this subject and not refer to his observations, or reply to his suspicions of its efficacy; it cannot be for want of having read them, as we frequently meet with quotations from the same book, by every author whose opinions I shall examine on this occasion.

In my opinion, it is a very imperfect method of treating a subject of this kind, to let the sentiments of former writers pass unnoticed. For suppose that an inexperienced student, or any one incapable of forming an opinion for himself, should in his search after professional information sit down to examine such a work as this of Mr. Bromfeild's with implicit credulity, not in the least suspecting the abilities of his author; would it not be rea-

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sonable for him to conclude, that the writer had availed himself of all former discoveries, and that the book before him must be replete with much additional information, if it was not ornamented with all the perfections of modern improvements.

SECTION

## S E C T I O N II.

### THE DIVISION OF MORTIFICATION INTO TWO SPECIES; ILLUSTRATIVE OF THE EFFECTS OF BARK AND OPIUM.

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HAVING thus far examined the opinion of one celebrated writer on surgery, I shall now endeavour to prove that this important subject has never yet been well explained. For, whatever may have been the private opinion of individuals, I hope to make it appear, that no public opinion has yet been established, nor is there any system now before the public, that points out any rational method for the treatment of mortification, but that the subject has remained in nearly the same state without any additional illustration, ever since the publication of Mr. Sharp's critical enquiry.

For the sake of ascertaining what is the public opinion, I shall take the writings of Pott, Bell, and I. Hunter. The first has written very little on the treatment of mortification, except respecting one distinct species of this disease, which he has not only more fully explained, but for which it was supposed that he had also discovered a specific remedy.

This species of disease is accurately described by Wiseman, but the distinction



tion was not so clearly pointed out. From Wiseman's time the same disease may evidently be traced through many subsequent publications; but the remedy was first discovered, and the diseases distinguished and described as a new species, by Mr. Pott.

It was necessary to notice this circumstance for the purpose of avoiding confusion, and to prevent the reader from thinking of one disease, when I was treating of another. With respect to those who wrote before Mr. Pott set this subject in a clear point of view, inaccuracy on their part would admit of some apology, but, since that period, inaccuracy or ignorance must be considered unpardonable.

The observations we meet with respecting the powers of the bark as a remedy in mortification, appears to me as a prefatory discussion introductory to his description of this species of disease, in which he found by experience that bark had no influence; it is therefore reasonable to conclude, that, one particular disease being the sole object of attention, the use of the bark in every other kind of mortification passed unnoticed; for it is evident the subject is only mentioned in general terms, as if the author wished cautiously to avoid giving his opinion in full on that part of the question. Not that I am satisfied that he ever formed an opinion respecting the powers of the bark in mortification; for if we may judge by the written evidence with which he has favoured the public, I think it appears evident that his knowledge of this remedy, and internal medicine in general, was either much inferior to his chirurgical abilities, or else that this part was passed over, as a subject more immediately connected with another branch of the profession.

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Under this supposition we may in some degree account for the inaccuracy and inattention with which he has treated this part of the subject, and whatever Mr. Pott has said in favour of the bark in mortifications in general, must certainly appear premature, so long as Mr. Sharp's opinion stands on record without notice or refutation.

No one, who is in the least acquainted with the professional character of the parties, will ever suppose that Mr. Sharp's critical enquiry would escape Mr. Pott's attention; on the contrary, Mr. Pott in his book on hernia which was published about six years afterwards, examines some of Mr. Sharp's opinions with such pointed accuracy, as evidently proves that the treatise on hernia, was either intended as a refutation of some of Mr. Sharp's opinions, or a further illustration of the subject.

On the operation of amputation the object of the two writers was very different, and the language of each is pointedly expressive of their respective intentions. Mr. Sharp, with scientific views, addresses himself to the rational and well informed part of the profession; whereas Mr. Pott, in a less limited style of popular discussion, has addressed the public at large.

We find the subject of mortification so far examined, as was necessary to prove that amputation could not be made use of with safety in any stage of the disease, but with this decision the enquiry ceases. On this part of the question he perfectly coincides with Mr. Sharp, who, in my opinion, had said all that was necessary more than thirty years before, and yet his opinion is never quoted, his arguments never referred to, nor his name ever mentioned.

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On subjects where their opinions do not so perfectly coincide, quotations frequently occur; but, on this occasion, we do not meet with a single reference; what was the reason I do not pretend to say; the omission might be accidental, or it might depend on a prudent caution, wishing to avoid a full examination of the subject. The truth is, that the treatment of gangrene and mortification, and whether the bark is, or is not a remedy, is not explained; nor is the very decided opinion which Mr. Sharp has given respecting the inutility of the bark ever noticed.

I shall therefore conclude, that this subject never did engage Mr. Pott's public attention. What was his private opinion, or by what rules he regulated his practice, I shall not presume to conjecture or determine. I have carefully examined his different publications, in the regular order in which they first made their appearance, and also in their subsequent editions, but have not met with any particular treatise on this subject.

His observations on the mortification of the toes and feet, and his remarks on amputation, with his general remarks on fractures, are the principal publications in which he has expressed his opinion; and will furnish us with some interesting information, illustrative of the point in question.

He begins his observations on the mortification of the toes and feet with asserting, that "the powers and virtues of the bark are well known to almost every practitioner in physic and surgery," whereas in my opinion these powers and virtues have not yet been discovered, or clearly ascertained. He says, "among the many cases in which its merit is particularly and justly celebrated, are the distempers called gangrene and mortification;



tification; its general power of stopping the one, and resisting the other, have made no inconsiderable addition to the success of the chirurgic art; but still there is a particular species even of these, in which this noble medicine most frequently fails: I mean that particular kind, which beginning at the extremity of one or more of the small toes, does, in more or less time pass on to the foot and ankle, and sometimes to a part of the leg, and in spite of all the aid of physic and surgery, most commonly destroys the patient."

In the first instance, the bark is said to possess the power of stopping gangrene, and resisting mortification; which seems to imply that these were two distinct species of disease, or at least that each term had some distinct signification. We frequently find in the writings of surgery that the two words are used synonymously, but on this occasion they are certainly mentioned either as characteristic of different diseases, or to distinguish different stages of the same disease.

The subject that Mr. Pott was discussing, was what he has termed a mortification of the toes and feet, not a gangrene of the toes and feet, as if the term was not applicable to this disease. It is not for the sake of making nice verbal distinctions that I notice this circumstance, but to prove that our author had not formed any distinct ideas on the subject, in consequence of which he has not determined whether the mortification of the toes and feet is of itself a distinct disease, or whether it is a species of the other two.

He says "among the many cases in which the merit of the bark is particularly

ticularly and justly celebrated, are the distempers called gangrene and mortification\*." They are expressly termed the distempers, which evidently implies a distinction between the two; and which is still more strongly marked when mention is made of stopping the one, and resisting the other. It is not here represented as one distemper known by two different appellations, but two distempers with their respective characteristic distinctions.

This is one view of the subject, but in the same sentence we find these two united, where it is observed, that "there is a particular species even of these, in which this noble medicine most frequently fails;" the species here alluded to, is the mortification of the toes and feet; but if we may form our judgment by Mr. Pott's own description, as this does not bear the least resemblance to any other kind of mortification, we must consider this a distinct disease.

He says that this disease "is very unlike to the mortification from inflammation, to that from external cold, from ligature, or bandage, or to that which proceeds from any known and visible cause, and this as well in its attack as in its process:" It is therefore only in the termination of these diseases that we meet with the least resemblance, in a practical view this last period cannot be an object of our consideration, as the vital principle being once extinguished, and the organization destroyed, it is impossible that the vital powers should be again restored; it is the business of physic and surgery to preserve the living parts, not to revive the dead; if then

\* Pott on the mortification of the toes and feet page 148.

mortification is that state of disease when the vital powers have become extinct, it is a disease for which there is no remedy; for which reason it is only in the early stages, that the powers of medicine can be interposed with much probability of success.

The mortification of the toes and feet is a disease so strongly marked, that all the descriptions we meet with nearly correspond, so much so, that not the least doubt can remain of the disease having been frequently noticed by a variety of authors; yet, at the same time that they gave accurate descriptions of what they saw, they did not suspect, that the cases before them differed from that mortification, which is the consequence of inflammation; but as they only resemble each other in their termination, and as they differ in every other respect both in their nature, properties, and subjection to the powers of medicine, we must consider this a disease *sui generis*, agreeable to Mr. Pott's opinion.

I have already mentioned that this disease was described by Wiseman, and if we compare what he has written with the observations of Mr. Sharp, and the still more accurate description of Mr. Pott, the similarity of expression must convince us that the subject was the same; but that no doubt may remain on this part of the question, I shall give the quotations in full: Wiseman says, "but as people are sometimes subject to gangrene by making fontanels; so others we hear of that have been gangrened from paring a corn or a nail on their toes \*"; and Mr. Pott makes use of nearly the same words; he says, "if the patient has lately cut his nails or corns, it is most frequently, though very unjustly, set to the account of such operation†".

\* Wiseman's surgery page 439.

† Pott on the mortification of the toes and feet page 149.



Mr. Sharp mentions this disease, but in less pointed terms\*; in his treatise on the operations of surgery, he attributes a gangrene in the toes to ossification in the arteries. About ten years afterwards he reviews the subject with more accurate attention, and then he says, "if from old age or any infirmity of body the blood should become so impoverished, as to lose its nutritious qualities, and the toes should begin to mortify before any other part, merely as the circulation in them is more languid, which will therefore consequently dispose them to feel the first effects of a depraved blood; in this instance also, the impropriety will be obvious, for if the mortification arises from the cause I have suggested, it is impossible to know so exactly the state of the blood, as to decide how much of the extremity would have perished; and without that knowledge, it will be rash to amputate†."

The disease, here alluded to, is certainly the mortification of the toes and feet, and though the basis of his argument is hypothetical, the conclusion against the propriety of amputation is without doubt, at this time, established on rational principles, and supported by experience.

The writers on modern surgery seem to have agreed to be particularly cautious on what occasions they refer to the opinions of their predecessors; and yet we frequently meet with sufficient evidence to prove that their works have not altogether passed unnoticed. When Mr. Pott speaking of this disease observed, that "it has by some been supposed to arise from

\* Sharp's treatise on the operations of surgery page 212.

† Sharp's critical enquiry page 260.

an ossification in the vessels, and adds but for this opinion I never could find any foundation but mere conjecture;" he certainly intended this as a reply to what Mr. Sharp had said respecting this disease.

Whether ossification is, or is not, a cause of this disease, I shall not now attempt to determine, it is mentioned as a probable cause in Mr. Sharp's first publication, but is not noticed in the latter; it is there attributed to an impoverished state of the blood, so that it cannot be considered as his decided opinion; indeed it appears to me only in the light of a theoretical speculation, introduced for the purpose of illustration; for let it be remembered that the cause of gangrene and mortification was not the principal object of his argument, but whether amputation was, or was not, a proper remedy.

I shall now solicit the reader's attention to Wiseman's description of a case, which evidently appears to me a striking instance of this disease; with respect to his method of treatment, it is certainly very imperfect, and in many respects highly objectionable, but on comparison will perhaps not be found so much inferior to the practice of modern surgery, as the distance of time and the improvements that have been made within the last century would induce us to imagine.

He says, "I was once sent for to a person of honour about sixty years of age. He was of a full body, and seemingly healthful; but in his latter years had omitted exercise, by reason of a stone in his left kidney. One morning in making himself ready he perceived a black spot on the upper part of his foot leading towards the toe next the little one. It was no bigger



bigger than a spangle, without tumour, pain or inflammation. It appearing bigger the next morning, he sent for his physician and chirurgon: they cut into it, and found it insensible. From that time it was rationally dressed; but it enlarged itself amongst the tendons, and especially towards that toe, and affected the bones. I being then consulted, and joined with that chirurgon, we cut off that toe, and checked the mortification. After which with much difficulty we extinguished the gangrene in the other parts by the various applications prescribed in the method of cure, and healed the sinuous ulcer. During which the physician purged him frequently, and prescribed an antiscorbutic decoction of *sarsa, china, lign. guaiaci*, with the plants proper in such cases, to dispose him to sweat; which he did some days. One evening whilst he was sweating, I being accidentally present, he told me he felt a numbness in the balls of his toes of the other foot. I looked upon them, and seeing them all black and dry, cut into them, and found them insensible. I supposed they might have been burnt by the bricks: neither the patient nor the apothecary that sweat him having discovered any thing of it before, we concluded it from the malignity of the humour, for they were directly gangrened; and by that method I cured them some weeks after. But three or four days after that, he was seized with apoplexy about eleven o'clock on Sunday morning. He recovered out of that fit, but died that afternoon in another\*."

The use of bark and opium, as remedies in mortification, was then unknown, and even at the present period, the powers of internal medicine appear to be rather undetermined. But respecting the use of the knife we meet with an uniformity of opinion, and I would wish it to be particu-

\* Wiseman's surgery page 439.



larly noticed, that Wiseman was as well convinced of the inefficacy of amputation as a remedy in this disease, as the most enlightened of modern surgeons; he says, "some other instances I could give of this kind; but this may serve to shew you to what little purpose amputations are in these cases\*."

I have selected this case from Wiseman, as an instance of this particular species of disease; and if we compare the two descriptions as given by Wiseman and Pott†, the coincidence will convince us of their similarity, but as this disease was first distinguished by Mr. Pott, until that time the treatment of every kind of mortification was nearly the same. The explanation that Mr. Pott has given of the treatment of this disease, and the observations that occur respecting the powers and properties of the different remedies, will serve to illustrate and explain the general plan of treating gangrene and mortification.

We are first informed, on the authority of assertion, that the bark has long been *justly* celebrated as a remedy in those distempers, called gangrene and mortification; this is not referring in general terms to what

\* Wiseman's surgery page 439.

† "It generally makes its first appearance on the inside, or at the extremity of one of the smaller toes, by a small, black, or bluish spot: from this spot the cuticle is always found to be detached, and the skin under it to be of a dark red colour."

"If the patient has lately cut his nails, or corn, it is most frequently, though very unjustly, set to the account of such operation." Pott on the mortification of the toes and feet page 149.

might be the public opinion on this subject, but it is expressly giving the opinion as his own; for to acknowledge the justice of an opinion is certainly to declare conviction of its truth.

The mortification of the toes and feet, is in the first instance mentioned as a species of the distempers called gangrene and mortification; if therefore the bark was known to be an efficacious remedy in one instance, it might also be expected to prove equally so in the other, for so long as the diseases were supposed to be similar, the same remedy might with propriety be considered applicable to both: but in the next page we are informed, that this disease is very unlike to every other kind of mortification, both in its attack and in its process, the diseases therefore being different, we may cease to wonder if each requires a different remedy.

Why then should our learned author suppose, "that many of his readers will be surprised at his affirming, that the bark will not stop the progress of this species of mortification; because there is another, in which it has been regarded as a specific?" He has given sufficient evidence of its inefficacy in one instance, but neither fact nor argument in support of its salutary influence in the other; so long as they were both considered as the same disease the practical evidence must have been general, and every unsuccessful instance must have then appeared in opposition to any favourable opinion of the bark, as a remedy in gangrene and mortification.

It is impossible that I should form any probable conjecture, what was the proportion between the instances of mortification of the toes and feet, and of those distempers called gangrene and mortification, that might occur in  
such

such extensive practice; but let the proportion be more or less, the want of success must be sufficient to invalidate the confidence of an attentive observer, and still his high opinion of the bark continued the same, and, what is yet more extraordinary, it is equally evident that he thought as highly of the powers of the bark in the mortification of the toes and feet, as in those distempers called gangrene and mortification; nor did repeated disappointment in the least diminish his good opinion of the remedy, till the obstinacy\* of his patient had compelled him to vary the method of treatment, in which instance the bark was omitted, and the patient recovered.

But even this did not convince him of his error, or induce him to suspect the efficacy of the remedies, or the propriety of the practice; this first successful case seems to have passed without attention, for in the very next instance that occurred the bark was adhered to with unshaken confidence, until accidental circumstances pointed out an efficacious remedy, and repeated experience proved that the bark had no influence on the disease.

If then Mr. Pott was deceived in one instance, was he not equally liable to be deceived in another, and if the constant use of the bark without success in one species of mortification did not convince him of its inefficacy, why should we suppose that his opinion of the powers of this medicine in other instances, is more to be depended upon?

\*“ Some time ago, I had a patient labouring under this complaint, who, from antipathy, obstinacy, or some other cause, could not be prevailed on to take bark in any form whatever.” Pott on the mortification of the toes and feet page 153.



He mentions having given the bark in the largest quantities and combined with a variety of other medicines, but opium is not noticed as one of them. For my own part I find it difficult to account for this omission, as it has been recommended by other writers, and from its well known powers as a cordial, would certainly have been a proper subject for his experimental enquiries.

Mr. Bromfeild \* whose chirurgical observations were published a very few years before these of Mr. Pott's, particularly recommends the use of bark with the addition of opium; but in the instance before us, the use of opium was not directed by the dictates of attentive reading, or the information acquired by extensive practice, it was not the result either of speculative ingenuity, or rational inference, on the contrary the whole was accidental.

This was the first successful case he ever met with, the event was unexpected, and the occurrence new; previous to this discovery it is reasonable to suppose, that after so many years of fatal experience, he must have concluded either that the disease was incurable, that the remedies he made use of were inadequate to the purpose, or have doubted the propriety of the whole method of treatment.

From this period we must date the distinction between the two diseases, till when every mortification was considered similar in its nature, and one method of treatment was applicable to all.

\*Bromfeild's chirurgical observations vol 1, page 132.

The correcting of the badness of general habit is here mentioned as a business that may be easily and expeditiously accomplished, and indeed expedition is highly necessary, when a disease is making such rapid and destructive progress; but the short interval between the commencement of mortification and the death of the patient, does not afford a momentary opportunity for any other consideration; to stop the progress or destroy the malignancy of a spreading gangrene, is an object of sufficient importance to engage our whole attention. But this is not my only objection: for the method that is directed is as improper as the time.

I do not pretend to assert that high inflammation, badness of general habit, or improper disposition of the limb would not either separately or jointly increase the danger; but I wish to consider the disease independent of such additional difficulties, and to regulate our plan of treatment, and form a prognosis of the event according to the degree and nature of the injury.

With respect to the position of the limb, it is creating a difficulty to suppose it improper. I am not contending against the errors of ignorance, or the misfortunes of inattention, nor am I stating a case, where an accomplished surgeon is called upon to correct the misconduct of empiricism; such assistance may belong to what is called the "help of art," but it is not the species of remedy that I am now endeavouring to investigate. I would rather suppose that all had been done in the early stages of the disease that the art of surgery could afford, that the patient, from the commencement of the injury, had been protected by the first professional abilities, and that Mr. Pott, or some other person of equal eminence, had directed the whole proceeding.

It is to the wounded state of the parts alone, that I shall refer as a cause of the disease, for we either must attribute the gangrene to the wounded state of the parts, or admit that the gangrene depended on some other cause. But whatever may be the cause, we must consider the disease to have taken place, and then examine the method of treatment.

We are told that "the sanguine and bilious must be lowered and emptied; and that the weak and debilitated must be assisted by such medicines as will add force to the vis vitæ." The word bilious, in its present situation, I do not understand; but supposing that bleeding and other evacuations might be necessary to abate the preceding inflammation, gangrene once having taken place, such remedies must be highly improper. If the subject was sanguine and bilious before gangrene took place, he would not require to be lowered and emptied afterwards; weak and debilitated he must certainly be in this advanced stage of the disease, and must require the assistance of such medicines as will add force to the vis vitæ. It is therefore much to be lamented that our learned author has neglected to mention, what medicines his large experience had found adequate to this important purpose.

In the next page a regular plan of antiphlogistic treatment is directed for the inflammatory stage of the disease, of which I believe anodynes are not intended to make a part; pain and irritation appear to me in this place to mark a subsequent and separate period, as pain and irritation are on this occasion said to stand in need of anodynes and the peruvian bark; so that we here find that anodynes have changed their company; before they were associated with the lancet, now they are united with the  
peruvian



peruvian bark. I am very well satisfied that bark and anodynes may be united under certain circumstances with great advantage, but I am also of opinion that, generally speaking, pain and irritation will terminate with the inflammatory symptoms, and consequently that in this early period bark cannot be given with safety, or can ever prove instrumental in abating the pain or correcting that species of irritation which is the immediate consequence of inflammation; and if the inflammation is in a great degree, I think it is very doubtful whether anodynes can be given with a rational prospect of success; but after the inflammation has subsided, anodynes may then be made use of with safety and advantage, either as cordials, to abate the irritation of debility, or to procure repose.

But if the inflammation that takes place in consequence of external injury to the extremities, does not produce a phlogistic diathesis, which is a question that will be afterwards determined, then, bleeding should be used with caution, and opium, for the same reason, may be given with less danger of increasing the morbid action and with greater probability of producing the desired effect. But the lancet and opium which should always be considered as two distinct and opposite indications, are in the present instance united in full force; he says, "that pain is to be appeased and rest obtained by anodynes, and inflammation is to be removed by free and frequent bleedings\*:" and after describing in general terms a plan of antiphlogistic treatment, he then observes, if our attempts do not succeed, the consequence is gangrene and mortification; but the bark is not mentioned as a remedy on this occasion. When suppuration has taken place, the bark is recommended both in his remarks on fractures, and in his re-

\* Pott's general remarks on fractures and dislocations, second edition, page 91.

marks on the necessity of amputation, but not as a remedy in cases of mortification.

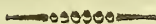
The distinction of the mortification of the toes and feet is an object of considerable importance, both in the science and practice of surgery; and the description both of the disease and method of treatment is plain and intelligible. But with respect to the use of the bark in other species of mortification, the whole is embarrassed with doubt, and veiled in obscurity.

To some it may appear rather extraordinary, that a subject of such importance should not have obtained a due share of Mr. Pott's attention. But when we consider that the powers of the human body and mind have both their limits; and that no one can either think, write, speak, or live for ever; we shall readily conclude, that no human exertions are adequate to the task of ensuring similar success on every occasion. And when we review Mr. Pott's successful labours in other branches of his profession, we shall cease to wonder, if some objects of equal importance should have passed before his eyes, in the busy croud of professional engagements, without having obtained a due share of critical observation in practice, or becoming a distinct and separate subject of theoretical investigation.

## SECTION

### S E C T I O N   I I I .

## AMPUTATION CONSIDERED AS A REMEDY IN CASES OF MORTIFICATION, AND THE AMBIGUITY OF THE PUBLIC OPINION ON THIS SUBJECT.



MR. Bell's system of surgery will with propriety become the next object of our examination: it is a work of too much importance to be passed by without a due share of attention, and respect. On the subject of amputation he says, "mortification is the next cause we have to consider by which amputation may be rendered necessary. They, who are determined to oppose the practice of amputation as much as possible, affect to consider it as unnecessary in mortification\*:" this singular attack on the fraternity of surgery appears to me as unintelligible as the reflection is severe and unjustifiable; it insinuates that a certain party of surgeons are determined to oppose the practice of amputation, even against their better judgments; for he says they *affect* to consider it unnecessary; which is asserting that, though they are convinced of the necessity, they affect to write, speak, and act, against their own conviction.

What surgeons may have said or done, I do not presume to be acquainted

\* Bell's system of surgery, page 311, vol. 6, fifth edition.



ed with; but what they have written is unalterable, and is the only evidence that deserves our attention. I must acknowledge that, as far as I can judge, I know of no such parties, who have acted in opposition to their own conviction; if they existed amongst the writers on surgery they should have been pointed out. Sharp and Pott are the only two who have written rationally on the subject, and who have given a direct opinion against the propriety of amputating in cases of mortification; do these then form the party to whom our author makes his satirical allusion? But rather let me ask whether such characters ever had any other existence than in the fertility of imagination; this however is a question that I shall not now examine, or presume to determine.

It is a common practice for writers on all subjects to invent difficulties for the sake of answering them, and in books of amusement such manœuvres are excusable; but on subjects of such importance to the health of individuals, and the happiness of society, every superfluity that is liable to mislead the young student, or bewilder the incautious reader, should be carefully avoided.

For my own part I wish to pay Mr. Bell every possible mark of attention and respect; and for fear I should be thought deficient on the present occasion, it is my sincere wish that not a single line that he has written on this subject should pass unnoticed. He says, "those who are determined to oppose this practice as much as possible, affect to consider it unnecessary, in mortifications;" from which we may infer that those who oppose this practice in a less degree would not affect to consider it unnecessary, perhaps they would lay aside all affectation and consider it *absolutely so*; but

but with respect to the former, even these only affect to consider it unnecessary, suspend their affectation and then they profess a contrary opinion.

On the present occasion it is not the manner of introduction which is the object of our attention; it is neither the inaccuracy of description nor the ambiguity of fiction that we are now attempting to investigate; it is not the manner of representation, but the real merits of the argument that engages our attention; and if we allow them to preserve their affectation, even then these imaginary characters will not answer the intended purpose for which Mr. Bell created them.

The argument then sets forth that all inferior degrees of mortification may be cured without amputation, and consequently this operation in such cases cannot be necessary; in the first place it is much to be lamented that these degrees of disease were not pointed out, and the method of treatment accurately explained, for in all such cases where there is a probability of cure the question ceases; we are not contending in favour of the removal of limbs in cases of curable gangrene, the question is, how far amputation may be considered a safe and efficacious remedy where the disease is considerable in degree, rapid in its progress, and dangerous in its consequences.

In many doubtful cases it can only be ascertained by the event, whether the disease will admit of cure; and the same degree of disease may be considered curable by one surgeon, and incurable by another. In some of these doubtful cases, if amputation is not had recourse to, the event is uncertain, and the patient may recover; but if after mortification has taken

ken place amputation is made use of with an intention of stopping the progress of disease, the event will no longer be uncertain, the operation decides the fate of the patient, and death is the inevitable consequence.

The plain truth is this, it is always improper to amputate a limb when the body is in a diseased state; so that when inflammation has taken place it is improper; and though mortification is certain to succeed, there is no period after the commencement of inflammation, when the operation can be performed with safety, until the mortification has terminated, and all morbid action ceased.

It is then observed in favour of this argument, that "when mortification is very extensive, the patient will commonly fall a sacrifice to the disease, whether the operation be performed or not\*." This may be true, for in all cases of extensive mortification the danger must be great, and the event uncertain, but the fact as here stated does not furnish us with any instructive evidence. In all cases that are incurable, the patient must inevitably die, whether the operation is, or is not performed; but cases may occur where the disease would not prove incurable if the operation was not performed, where nature might have supported the vital powers against the influence of disease independent of the operation, but where the influence of disease and the operation united may destroy the powers of nature.

Amputation is therefore improper in all cases of gangrene; in flight

\* Bell's system of surgery, vol. 6, page 312, fifth edition.



degrees it is improper, not only because it is unnecessary, but because the disease, which was not in itself dangerous, would be rendered inevitably so by the operation; and the objections to the operation will increase with the extent and degree of disease. For in cases of spreading gangrene not only the mortified limb, but the system is in a state of disease, a diathesis of the putrid kind must under such circumstances pervade the whole.

The discharge from the injured part, and other local appearances will evidently mark the commencement of putridity; and the general symptoms point out with equal certainty the extent and degree of constitutional disease; to operate at this period would be laying an additional load on the sinking powers of nature, without the least rational prospect of advantage; for if the whole system is affected, by amputation we only remove a small and unimportant part of the disease, and if the disease is limited to any certain part, then the operation is no longer an object of our consideration.

After asserting in behalf of his imaginary opponent, that, when the mortification is very extensive, the patient will commonly fall a sacrifice to the disease, whether the operation is performed or not: Mr. Bell, on the other side of the question, observes, "that this opinion is directly contrary to fact and experience, and contends for the propriety of amputating in cases of extensive gangrene\*;" but the argument is inaccurately stated, for we certainly should have been informed under what circumstances recovery was probable without amputation, and in what instances the operation was the only remedy.

\* Bell's system of surgery, vol. 6, page 312, fifth edition.

If the art of surgery possesses any other remedy for this formidable disease, it should have been pointed out; what method of treatment would have been proper on the commencement of the disease, should first have been explained, and if it was possible to stop its progress in more advanced stages, and what internal medicines, or external applications would contribute to promote the salutary purpose, should have been particularly mentioned.

We are not even informed how far the knife may be looked upon as an efficacious remedy, or whether amputation will, under any circumstances, stop the progress of the disease; but, hastily passing over these very important stages, without ever noticing any one critical period when either medicine or operation may be interposed with advantage, we are at once informed, that, when a limb is destroyed by mortification, "amputation is indispensable\*." But under such circumstances amputation is not a remedy for mortification, it can only be made use of for the removal of a dead part, which is become an offensive incumbrance to the living body, and which nature would herself accomplish; in this instance the surgeon may remove a dead limb as soon as he pleases, but if it is thought necessary for the patient's future comfort to make a convenient stump, and for that purpose to operate on the living part, it will still be necessary to observe the same rule, and not to operate until all diseased action has subsided. So that in this instance amputation is not a remedy against mortification, but a remedy for the deformity that the mortification has occasioned.

\* Bell's system of surgery, vol. 6, page 312, fifth edition.

The next question that is presented to our consideration is, the period when amputation may be had recourse to with the greatest probability of success. In cases of spreading gangrene, the propriety of amputating is not condemned, as a practice so contrary to the dictates of reason, as the evidence of experience; and sufficient is said in favour of this method of practice to induce the injudicious, who have only a superficial knowledge of their profession, to try the experiment. For this reason, and in my humble opinion, for this only, Mr. Bell's arguments have a very urgent claim to our attention.

Suppose, for instance, that a person, incapable of judging for himself, or a young man diffident of his own abilities, should consult Mr. Bell's system of surgery, and regulate his conduct by his instructions; we will suppose the case under his care to be a mortification of one of the extremities, in consequence of external injury; and the state and degree of disease to be such, as might be considered favourable for the operation by those who were ignorant of its impropriety under such circumstances: Mr. Bell's arguments would not only serve to justify the operation, but would influence as a powerful inducement in favour of this irrational and destructive practice.

In the first place the propriety of amputating in cases of spreading gangrene is not objected to as in itself improper, but as doubtful in the event, the hazard depending on the difficulty of ascertaining the limits of the disease; in consequence of the disease having made greater progress on the internal parts, than might be expected by a superficial examination of the integuments; and though our author does reluctantly give an opinion



on to the contrary, he is certainly a zealous advocate on the wrong side of the question, and in favour of that opinion which he is unable to support.

The ambiguity of the conclusion serves to elucidate the bias of our author's opinion; and to determine the validity of his arguments, he says, "if the operation is performed while mortification is advancing, the disease scarcely ever fails of seizing the stump," and immediately adds, "at least I never knew an instance to the contrary."

Why then should he observe that the disease *scarcely* ever fails of seizing the stump, when he immediately acknowledges that he never knew an instance to the contrary; the expression must certainly imply that the disease does sometimes fail of seizing the stump, and this is all that would be necessary to justify the practice; for in cases so desperate where the hazard is so great, if in a few instances the patient escapes with life, we then must admit that the practice is not irrational.

But as Mr. Bell never met with a successful instance, though he acknowledges that "he has unfortunately happened to be concerned in different cases where this practice was adopted;" and as he has candidly favoured us with what may be considered a satisfactory confession that he never heard of a successful instance, and if he had ever met with one in point he ought either to have noticed it, or given an exact quotation; I shall therefore conclude, that, under such an accumulation of conviction, such repeated instances of fatality, and disappointment, instead of saying scarcely ever, he should have asserted that with the most unquestionable certainty under such circumstances the disease will appear in the stump, the whole system become putrid, and the patient inevitably die.

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The truth is, that the whole doctrine, on which this opinion is founded, is repugnant to the laws of nature and the principles of the animal œconomy; so that the existence of such an instance is impossible.

For my own part I have met with some useful lessons in the course of my own practice and observation; but it is not possible that I should ever have an opportunity to determine the question on the authority of experimental evidence; as I hope I shall never be induced to act against my own conviction, or to sanction in another what I should consider a reflection on my own understanding, a reproach to my humanity, and an irreparable disgrace to my professional character.

The opinion is at last relinquished, and Mr. Bell acknowledges the impropriety of amputating in cases of spreading gangrene. He observes "that it was also the decided opinion of the late Mr. Sharp, Mr. Pott, *and of every modern practitioner of observation,*" and immediately adds, "I think it right to mention this, as attempts have of late years been made by some speculative practitioners, to induce a contrary practice." According to his own statement the speculative practitioners must be considered of a very humble order, and so destitute of common sense as to be incapable of observation; for he previously asserts that every modern practitioner of observation is of a contrary opinion; why then should this unnecessary discussion be intruded on the public, or these imaginary characters brought forward, in support of an opinion that is in itself repugnant to all the evidence of nature? The propriety of amputating during the progressive state of the disease being no longer an object of our consideration, the next question is, what is the time when the operation may be performed with safety and advantage?

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On this occasion, for want of some rational guide, we meet with similar difficulties: at least I think this part of Mr. Bell's system is equally imperfect; he disapproves of the delay recommended by Mr. Sharp†, and contends that the operation should be performed as soon as possible after the termination of the disease. He says, "I would consider it as sufficient to wait till the mortification is fairly stopped, but not much longer: In this manner, we seem to reap all the advantages which the caution we have advised can give; and the earlier after this that the mortified parts are removed, the more readily will we prevent the system from suffering by the absorption of that putrescent matter which a gangrenous mass universally yields\*." Thus early amputation is certainly Mr. Bell's leading object, but this last effort seems no better supported than the former; his motive is to prevent the absorption of putrescent matter, but to effect this it will be necessary that the whole of the mortified parts should be removed; and if the whole of the mortified parts are to be removed, some portion of the sound parts must of necessity be removed with them, so that to effect the object completely which Mr. Bell has in view, the operation of amputation on the sound parts must be regularly performed.

† "I have laid it down as a Rule, that the Mortification should not only be stopp'd, but advanc'd in its separation; the reason of which is, that though the Blood is so much alter'd for the better as to occasion a stoppage of the Gangrene, yet at this point of alteration 'tis still in a bad state, and should be left to mend, with the utmost tranquility of Body, and assistance of Cordial Medicines, 'till such time as Granulations of Flesh upon the living part of the Extremity shew the balsamic Disposition of the Blood: In the mean while, to take off the Stench of the Gangrene, it may be wrapt up in spirituous or odoriferous Applications.'" Sharp's operations of surgery, page 214.

\* Bell's system of surgery, vol. 6, page 316, fifth edition.

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In this stage of the disease our object is not so much to remove the dead parts as to preserve the living; it is therefore not the state of the dead parts, but the state of the living parts on which the operation is to be performed, that is to direct our conduct. A partial removal of the mortified parts cannot be productive of the least advantage; if any absorption of putrescent matter does take place, it must be from that part which is in immediate contact with the living, and as it would be impossible to separate the dead and living parts without some painful operation, this additional injury would exasperate the disease, and increase the danger.

In a scientific view the removal of part of a dead limb is certainly not worthy of our consideration, but trifling as it may appear to the surgeon, either in science or in practice, the patient may view the business in a different light; and in such cases of danger and distress, every probability of alarming the patient should be carefully avoided: at the same time we should consider that this first operation does not end the business, and whether it is, or is not performed, the second will be equally necessary.

The part where the operation might take place is not mentioned; but as Mr. Bell's object is to prevent the absorption of putrescent matter, he certainly would fix on some part beyond the limits of putrefaction. In the few instances where the patient survives the mortification of a limb, we must expect to find the whole system much exhausted; in this state to operate would certainly not be advisable, except by such hasty proceedings some impending danger was to be avoided, or some considerable advantage to be obtained.

By reasonable delay, the constitution will acquire returning energy, and  
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the powers of health be in some degree restored. In most cases there is a time when nature particularly requires assistance, and it betrays a want of professional knowledge to direct their conduct, when either surgeons or physicians intrude their assistance before it is necessary.

In this instance there is a time evidently pointed out, when the operation should take place; and that is, when the patient has recovered as much as possible from the debilitating influence of previous disease, and before he begins to sink again in consequence of the discharge from the parts, where nature is effecting a separation. This will be the period when nature will have regained her full extent of returning energy, and when amputation may be undertaken with the greatest probability of success.

I cannot conjecture what was Mr. Bell's motive for opposing Mr. Sharp's opinion on this subject, but, if he was determined to oppose, he certainly should have supported his opposition with either facts or arguments superior to those that he wished to invalidate. The quotation he has given is a partial one, in justice therefore to Mr. Sharp, in justice to Mr. Bell, in support of my own opinion, and for the satisfaction of the public; I shall beg leave to give Mr. Sharp's own words more at large, and thus having given the evidence in full, every reader is at liberty to form a judgment for himself.

Mr. Sharp says, "But what seems to be of much greater Importance in this Consideration, than any of the Reasons I have already alledged is the ill state of Health that the patient labours under whilst a Gangrene is spreading, be it of one kind or other; for at this time the Blood is frequently so  
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thin, as to lose even its florid appearance, and it is not unusual for fatal *Hæmorrhages* to succeed, in consequence of this thinness, not from the great Vessels, but from an Infinity of small ones in every part of the Stump. The mere danger of a *Hæmorrhage* is then another Objection; but though this should be escaped, yet nature will generally sink under so violent an Operation, where the Blood is deprived of its Balsamic Qualities, and the Strength of the Patient is so much exhausted. On these accounts the propriety of deferring Amputation will be evident, not only till the Mortification is stopped, but till the Separation is pretty far advanced; for by this measure, under a proper Treatment, the Blood will recover a healthy State and Consistence, and the Patient will be better enabled to bear up against the Fatigues and Danger of the Operation\*.”

\* Sharp's critical enquiry, page 262

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SECTION





## SECTION IV.

### THE PHYSIOLOGY OF THE CIRCULATION OF THE BLOOD CONSIDERED AS THE BASIS OF THE PATHOLOGY OF INFLAMMATION AND ITS CON- SEQUENCES.

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WE come now to a work \* of a different character from any that we yet have had or shall have occasion to examine; in which every page abounds with the evidence of originality, in which the writer has attempted to investigate the first principles of the animal œconomy, to explain the phenomena of diseases, and establish the practice of surgery on a philosophical, and rational basis. This is certainly a subject that merits our attention, and we may admire the heroism of the enterprise, though we are under the painful necessity of lamenting the want of success.

If we look back *a century*, we shall find it was the fashion to give plain descriptions of diseases, and to point out the method of cure by a catalogue of remedies, or by exact copies of prescriptions; medical books were then intelligible: but since modern refinement has changed the mode, and

\* A treatise on the blood Inflammation and Gun-shot Wounds by the late John Hunter. 1794.

mystery

mystery has acquired a decided preference, the medical writers of the present age have been obliged to comply with the exigency of the times, under a certain expectation that the less a book was understood, the more it would be admired, and the more generally approved.

The nature of the blood and the structure and mechanism of the sanguiferous system, are on this occasion the principal subjects of Mr. I. Hunter's anatomical and physiological investigations; but when we consider this partial examination of the animal system, as the basis of the first principles of a new method of treating surgical diseases; the least inaccuracy will break the connection; and one single error invalidate the whole argument.

Nature itself is perfect, and though it never may be in our power to investigate the whole, yet every partial explanation will bear similar evidence of perfection, and the vacancies may be considered as intermediate spaces or links in the chain, which future ingenuity may afterwards explain.

If a perfect knowledge of nature is not to be obtained, every system of physiology must be imperfect, but this is no reason why it should be erroneous. I shall not attempt to follow Mr. I. Hunter through the whole, as a refutation of his opinion in a few instances will be sufficient. If his theory of the animal œconomy be erroneous, the practical inferences must fall in consequence; he says, "I have endeavoured to form this work into a regular system, one part exactly depending upon another \*."

\* I Hunter on gun-shot wounds, page 2.



Many system-builders have made similar attempts, so that this is not the first instance we meet with, when theoretical speculations, and practical inferences have been at variance. When inflammation was supposed to depend on obstruction, it was cured by deobstruents; but when spasm became the cause of this disease, then antispasmodics became the remedy. If then evacuations were made use of in both instances, in the former they acted as deobstruents, in the latter as antispasmodics. The truth is, that the theory and practice of physic have not that connection, which some speculative writers and equally credulous readers have been disposed to imagine.

I do not intend to insinuate, that the theory of medicine is either useless or unnecessary; it may serve on many occasions to connect our ideas, and prove highly instrumental in the arrangement of practical information; but it is an object of great importance, to distinguish between the hypothesis of speculation, and that theory which is founded on the evidence of nature, in a state of health, and the phenomena of disease. When any speculative opinion, that has the appearance of ingenuity has once become an object of public attention; if the means of detecting the imposition are not within the limits of general observation, it soon becomes established as an important truth.

If we examine the theory of blood globules, and the use of the microscope when applied to anatomical purposes, the more attention we pay to the subject, the more we shall be astonished, that ingenious men should be led away by such visionary doctrines. Malpighi and Leuwenhoek first gave rise to this chimera, and the credulous public has ever since been either dazzled by the blaze, or duped by the delusion.

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I shall not have occasion to repeat the experiments for the purpose of proving the fallacy of this hypothesis; the discordance of opinion will sufficiently illustrate the present state of this subject, with the addition of all the splendid decorations of modern improvements. At the same time it will be proper to observe, that it is not an object of much importance on the present occasion, whether the blood is composed of red or white globules; the question is, whether Mr. I. Hunter's opinion bears the appearance of consistency, and whether what he has written on the general principle of the blood, will in any respect illustrate the subsequent parts of the subject?

If his observations are ill-founded, if his arguments are unconnected, his theory must be set aside as unworthy of attention, and we shall then have to examine his method of treating inflammation, and mortification, on a practical basis independent of any theoretical speculation.

We are told in the commencement of this discussion, that, "the blood is a material object in the theory of inflammation;" which induced me to expect a regular connected train of arguments, explanatory of the operations of the animal system, both in a state of health and disease; and though the system might in many instances have proved imperfect, yet the outlines would have displayed some useful information. But I have carefully examined the whole, and am under the necessity of acknowledging, that I can discover neither connection of argument, nor rational inference.

In the analysis of the blood we find this fluid divided into three component parts; the red globules, the serum, and coagulating lymph. This latter

latter seems to occupy his principal attention, and is represented as the most important part of the circulating fluids. The process of coagulation is particularly noticed, and represented as the basis of several of the animal functions; as if the animal actions were included in some analogous operation, such for instance as the change of fluids into solids, and even the accretion and increase of different parts of the animal body.

But this is evidently reasoning on false principles, as the operations of the animal mechanism are not analogous to the chemical operations that take place in inanimate matter; or the changes that take place in animal matter, in consequence of parting with its vital principle. And whatever may be the merit of his conjectures, the manner in which he concludes this part of the subject evidently determines the imbecility of his arguments.

After examining the progress of coagulation under different circumstances, and in various points of view, he concludes by giving to the blood consciousness and the power of volition, to regulate the business of coagulation, for "good purposes on necessary occasions\*;" and sums up the whole, by giving his opinion that "it coagulates from an impression of its fluidity being no longer necessary; it then coagulates to answer the necessary purpose of solidity."

But we may as well suppose that the freezing of water depends on an impression of the necessity; or if, for the sake of more strict analogy, we confine our observations to the changes that take place in extravasated

\* I. Hunter on gun-shot wounds, page 25.



animal fluids under different circumstances; we might with equal propriety conclude, that the change of milk into butter or cheese depended upon consciousness and volition.

In the former page we meet with an explanation of this necessity. "By action taking place from necessity, effects are meant which arise in consequence of some unusual or unnatural change going on in the parts." The change of fluids into solids for the support, renewal, or increase of the different parts of the animal body is a regular process, that cannot be considered either unusual, or unnatural; and whether this animal function is performed by any process similar to coagulation, or by any other operation, more consistent with the laws of animal life; this must be considered one of the most natural operations of the animal system.

If what is constant and uniform can be considered unusual or unnatural, the present statement would then appear less objectionable: but as coagulation is a regular effect, that we have daily opportunities of observing, it must certainly be considered a natural operation, or a change that takes place in consequence of disorganization, or a loss of vital principle. But even if every fact was supported by the evidence of nature, they form in their present state a miscellaneous assemblage of unconnected observations; that do not in the least illustrate the œconomy of the sanguiferous system in a state of health, or serve to explain the nature and properties of disease.

It is certainly the perfection of philosophical empiricism, to form conjectures without evidence, or to attempt to carry an analysis of nature beyond

yond the bounds of rational investigation; it is also equally irrational to attempt to explain different subjects, that have no relation to each other, by similar laws, or to suppose that one mode of demonstration is equally applicable to every branch of natural philosophy.

The laws of gravitation were, about a century ago, made use of to explain the phenomena of chymistry; and the operations of chymistry have in their turn been applied, with no less impropriety, to illustrate the organization of animal life. Even in Haller's time, the method of analysing the blood was by distillation: but as distillation is not an animal process, and as we do not meet with any such apparatus in the animal machine, this species of investigation would not improve our knowledge of this subject.

If we attentively examine Mr. I. Hunter's observations on the serum of the blood, we shall find that he has been amusing himself and his readers with delusions equally unnatural; he heats the serum of the blood to 165 degrees to make it coagulate, and the \*gravies of both boiled and roasted meats are introduced as evidence on this occasion; but, as none of these circumstances are analogous to life, they are all inapplicable to the present subject. The gravies of dressed meat might furnish conversation to a convivial professional party, but appear as an useless intrusion in their present situation.

Some of his experiments are made in imitation of a chymical compo-

\* I. Hunter on gun-shot wounds, page 32.

fition, by mixing the serum of the blood with spirit of wine, volatile spirit, salt of hartshorn, and with water; but all these experiments are equally objectionable: as such compositions never take place in the living animal, they cannot in any respect explain the animal functions, either in a state of health or disease. Even Mr. I. Hunter himself acknowledges the inutility of his own experiments; he says, "Heat, to a certain degree, coagulates this part; and probably this is the only test necessary to know whether a fluid, found any where in the body, not coagulable in itself, is this part of the serum; but as many substances do also coagulate it, I shall mention a few of them; although to me their effects do not seem to throw any light on the subject\*:" and two pages further he observes, "that the following experiments are not perfectly conclusive."

I do not urge that this is a sufficient reason why these experiments should not have been made, as the speculative philosopher must make a number of useless experiments before he attains the object he has in view; but as the first do not throw any new light on the subject, and the last are not perfectly conclusive, and as in my opinion they do not in the least add to our knowledge of diseases, or the method of treatment; they will only serve to bewilder the credulous and incautious reader: which is a sufficient reason of itself, why they should not have been intruded on the public.

If we attend to his observations and inferences, we shall find them as inconclusive as his experiments; so much so, that was it not for the pur-

\* I Hunter on gun-shot wounds, page 31.



pose of demonstrating the imperfections of this branch of physiology, I should not have brought them forward on this occasion. In one place he says, "that the serum is greatest in quantity, when the blood globules are most abundant\*." This appears to me to be a curious observation; and though it may pass unnoticed by the inattentive, I think it is well worthy of our consideration. In the first place we must admit, that it is difficult to ascertain the number of red globules in any given quantity of blood; and, if we cannot ascertain the number, we cannot estimate the quantity.

But independent of this difficulty, as the quantity of serum is said to increase in proportion to the quantity of red globules, the argument implies a contradiction in itself; for if the increase is equal, the proportion must remain the same.

On another occasion, speaking of the diseased state of the valves of the aorta, he says: "It must have begun much earlier in life than such diseases commonly do, as the symptoms appeared when he was young†;" and then in a marginal note, adds, "I have seen it at a very early period." This is in the first instance insinuating that this disease does not take place at an early period, and then immediately admitting that he has seen the contrary; it is giving an opinion in the face of his own evidence; he first states an opinion, and then brings facts to prove the contrary.

I shall only trouble the reader with two more examples of this species

\* I. Hunter on gun-shot wounds, page 36.

† I. Hunter on gun-shot wounds, page, 58.

of inaccuracy. He says, "the globules of white serum differ from the red globules in colour\*," and concludes his experimental investigation of the serum of the blood with this observation, "that the white part of the white serum sunk in water†." That white and red should differ in colour, is here represented as an important discovery. With respect to the white part of the white serum sinking in water the fact might have been as here stated; but this explanation is imperfect, for as the white part of the white serum is not supposed to be the only part, the other parts should have been described, and satisfactory information given what became of them.

The red part of the blood is the next object of our attention; this, we are told, is of less importance than the coagulating lymph, and the reason is a curious one; all animals that have a complete circulation and are considered of the most perfect kind have red blood; but as the blood of some reptiles and insects is not red, consequently the red part is of inferior importance. But as quadrupeds, which are considered the first class of animals, have all red blood, I should suppose that the red part of the blood is as important a part of their fluids, as the lymph and serum may be of other animals; and consequently, so far from considering the red part of the blood of the least importance, I should rather estimate its importance by the perfection of the class of animals which it invariably belongs to.

Why this question of precedence should be so warmly contended for,

\* I. Hunter on gun-shot wounds, page 39.

† I. Hunter on gun-shot wounds, page 28.

I am at a loss to conjecture; or why any one should endeavour to oppose that evidence which appears most satisfactory. We are not sufficiently acquainted with the mechanism of animal life, to enable us to form clear ideas of the use and properties of the different parts of the blood; and I fear that the observations before us will not reflect any additional light on this subject.

He acknowledges that respiration is an important animal function, and also mentions that the colour of the blood is changed by passing through the lungs; and this is represented as an object deserving our attention. But still he contends, that \*respiration must produce some other effect still more important; for he says, "if we suppose the change of colour in the red globules to be all that respiration is to perform, we shall make the red globules the most essential part of the blood, whereas they are least so." But this is a subject that, in my opinion, does not admit of degrees; as all parts, that are essential to the life of an animal, must be considered of equal importance.

The evidence here brought forward clearly proves the importance of the red part of the blood in the more perfect animals; but an attempt is made to supersede the authority of this evidence, by the introduction of a supposition that respiration produces some other effects, which the superior abilities of this anatomist have not yet been able to discover; and respecting which his ingenuity has not even formed a plausible conjecture, and all this for the important purpose of supporting a whimsical opinion,

\* I. Hunter on gun-shot wounds, page 51.



and endeavouring to prove, that one part of the blood is more important than another.

That I may avoid all suspicion of misrepresentation I shall beg leave to copy the original description: our author observes, "that most probably the effects of the air upon the blood are greatest on the coagulable lymph, and this conjecture is rendered more likely when we consider that in animals which have no red globules of any kind respiration is as essential to their existence as any other \*."

This is a curious argument, but I think the sophistry will be easily exposed; the first observation informs us that most probably the effects are such, and consequently the argument commences with doubt and is incumbered with apprehension: whereas a philosopher, who is convinced of the truth of what he is about to assert, will not express himself in doubtful terms, but every word will imply conviction.

In the present instance for the purpose of supporting a conjecture, for it is only termed a conjecture, though it is evident that this conjecture is represented as an important truth, he then observes that "this conjecture is rendered more likely, when we consider that in animals which have no red globules of any kind, respiration is as essential to their existence, as in any other." But this assertion is incorrect; I do not deny the necessity of respiration to a great variety of animals that have not red blood, but if we trace the subject through the whole chain of natural history, we shall find the evidence against the point in question.

\* I. Hunter on gun-shot wounds, page 51.

The quadruped is the animal to whom respiration is the most necessary and where it is least under the influence of the will. Quadrupeds have warm blood; and in this class of animals constant respiration is so necessary to life, that a very short suspension of this important function will immediately put a stop to all the vital powers.

In those animals called amphibious, the blood is red but cold; in these the construction of the heart and lungs is very different from those of the quadruped: the blood does not all pass through the lungs, and respiration is more under the command of the will. The effects of respiration on the red part of the blood are evident to our senses in both instances; but whatever effects it may have on the other parts of the blood is yet unknown, in consequence of which Mr. I. Hunter concludes, that visible effects are less than invisible, and that evident facts are of less importance than visionary conjectures.

Though I do not wish to have the red part of the blood deprived of its importance, I cannot so implicitly subscribe to one of its most distinguishing titles. The red part of the blood has for more than a century been distinguished by the term of red globules, and this was the only part of the blood that was at first supposed to be formed of globules; but modern physiologists have attempted to improve on this original discovery, and assert that the chyle\*, of which the blood is formed, is in the first instance itself formed of globular particles; and not only that the red part of the blood but also the lymph and serum are all formed of globules, and even the milk which is secreted from the blood is of similar construction.

\* I. Hunter on gun-shot wounds, page 72.

I expect that it will be considered an instance of unpardonable scepticism, to question the truth of a general opinion, that is sanctioned by such high authority; and if the question depended on any presumptuous accuracy of my own observation, or on any imaginary dexterity in conducting such optical experiments, I should not attempt to set my own opinion in competition with that I am about to call in question.

But in the present instance, as well as in many other parts of this inquiry, it is not necessary to determine the intrinsic merit of every question that may occur; my present object is first to examine the validity of the opinion of others, and by a general exhibition set the whole subject in a clear and intelligible point of view. If the representations of former writers do not possess the evidence of truth, if their facts are not perspicuous, if their arguments are not connected, and their inferences are irrational, I hope we may then take the liberty of questioning the validity of this high authority, and certainly it will not be necessary to prove whether the small particles of animal fluids are either planes or spheres; it is the present state of the public opinion, and not the evidence of nature, that we are now about to investigate.

At the same time let it be remembered, that I wish to try every question by the immutable laws of truth; in expectation that the result may prove an illustration of some of the first principles of nature.

The grand discovery of blood globules first originated with Malpighi and Leuwenhoek, about 130 years ago; and seems to have been taken upon credit by all succeeding writers, who from that time to the present day,



day, all express themselves with such unlimited confidence, as if the phenomena of blood globules were too evident to be considered a matter of doubt, or remain a question of uncertainty.

Mr. I. Hunter introduces this subject by observing that "the blood, whilst circulating in the vessels, appears to the eye to be a homogeneous mass; but when it is passing in vessels so small as almost to separate its visible parts, and is viewed in a microscope, there is no appearance but that of globules moving in the vessels\*." The white globules in all probability here became invisible, as it certainly would be highly indecorous to suppose that they were left behind; for if the red globules are the least important part of the blood, the laws of subordination would forbid that they should take the lead.

But if such is the appearance of the blood in the microscope, the method of ascertaining the fact should have been accurately described, and the readers instructed how to repeat the experiments, that they might also have the evidence of their own senses. Such nice experiments require great accuracy, much more so than the general pretenders to philosophy are possessed of.

The whole at present depends upon assertion, and we are not even informed whether the parties ever attempted a critical examination of the subject, by experimental investigation; whether the experiments were conducted with caution and ability, or whether the whole at last was not a microscopic delusion.

\* I. Hunter on gun-shot wounds, page 15;

What ever experiments Mr. I. Hunter may have made on this subject, it is evident from his own confession, that he does not depend upon what he has seen in the microscope, so much as he seems influenced by the opinion of others. If he had ever examined the subject experimentally, whether the blood globules preserved their spherical form on all occasions, or whether they ever became \* elliptical by adapting themselves to the size of the vessels, as some have asserted; he would not have expressed himself in the language of doubt and uncertainty; he should have asserted what he had seen, and determined whether what had been said before was right or wrong.

He says, "they are formed of an oval figure in some animals as authors have described;" which evidently implies, that he was not provided with evidence either to confirm, or oppose the assertion; but concludes by observing, that "this is probably an optical deception†:" and this is the object that I have in view; for if Mr. I Hunter suspects an optical deception in one instance, we certainly have an equal right to suspect the whole.

In the former page he says, *Malpighi* mistook the globules of blood for globules of fat; from which we find that this investigation began in error, and according to his own confession *Leuwenhoek* is not to be depended on; and if it is Mr. I Hunter's opinion that these early observers probably imagined more than they saw, it is evident that he was not satisfied with their experiments.

\* I. Hunter on gun-shot wounds, page 41.

† I. Hunter on gun-shot wounds, page, 42.

Mr. Hewson is the next author that we have to appeal to, he is said "to have been at great pains to examine the blood in the microscope, and has given us figures of the different shapes of those globules\*;" but Mr. I. Hunter adds that "there is reason to think he may have been deceived in the manner I have just mentioned."

If Mr. I. Hunter is of opinion that Mr. Hewson was deceived, who has given descriptions of his experiments; I hope I shall not be suspected of want of candour, if I express my suspicions of the opinion before us, where not a single experiment is described, or representation given of the result; and if I add in his own words, that "this is probably an optical deception†," at least I shall take the liberty of doubting the fact until I find it supported by proper evidence.

Mr. Hewson supposed that blood globules were formed in the spleen, because, says he, they are found in its excretory ducts, but unfortunately the excretory ducts of the spleen have never yet been discovered; to remedy this imperfection the lymphatics of the spleen were supposed to supply the deficiency; but the secretions of other glands are not found in their lymphatics, the liver is furnished with lymphatics, but has also its proper excretory ducts. For the purpose of supporting a new hypothesis the lymphatics are converted into blood vessels, and the lymph into red globules, and the spleen represented as the original source of a nonentity.

\* I. Hunter on gun-shot wounds, page 41.

† I. Hunter on gun-shot wounds, page 42.

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When Harvey discovered what is called the circulation of the blood, his explanations were so clear and intelligible, as to free the subject from all future doubt and uncertainty; and if the present subject had been equally plain and self evident, we should meet with equal uniformity of opinion.

Mr. Hewson observes that the particles of the blood are not, as Father de la Torre supposed, annular or hollow rings, but that the blackish spot, which he imagined to be a perforation, is a solid body, the sides of which are filled with a subtile fluid; but Mr. I. Hunter was of opinion that Mr. Hewson, like the early observers, probably imagined more than he saw.

A Mr. Falconer, who had been a pupil to Mr. Hewson, repeated his experiments, and if I was to depend on the authority of a single evidence, without having examined any other book on this subject, I should be ready to acknowledge that the accuracy of his descriptions would give additional testimony to Mr. Hewson's opinions. But another and another still succeeds, and Mr. Cavallo objects to these new opinions, and gives his testimony in favour of the globular form of the red particles of the blood.

Where then, in such a labyrinth, must inquiry stop, and when must this system of *confusion* end? This great philosopher, like all his learned predecessors, points out the absurdity of such hypothetical conjectures; and candidly acknowledges, "that the red particles of the blood have been attentively examined with the best microscopes, and the appearances, which have been partly observed and partly supposed, have given origin to a  
variety

variety of conjectures and hypothesis, generally fanciful, and often absurd\*." On a point of such delicacy I should wish to be impartial, and that I may not offend any individual whose opinion I have here presumed to notice, I am ready to acknowledge that I think them all of equal merit, and that it is not in my power to determine whose labours have most contributed to the improvement of the science of medicine, or the decoration of the philosophic page, and even that the opinion of the last is as much deserving of our admiration, as the most illustrious of any of his predecessors.

I believe few will question the abilities of Swammerdam. In the use of optical instruments and minute dissection he displayed a degree of ingenuity and dexterity perhaps unequalled; and the accuracy of his descriptions must convince the reader of the truth of his assertions; his book is not an assemblage of speculative opinions, but representations of nature. At the time that the doctrine of blood globules first made its appearance, Swammerdam was in the meridian of life, and pursuing the study of microscopic anatomy with uncommon industry and success.

He has given a plate of the blood of a louse, as it appeared in a glass tube in a powerful microscope; in which are described a great number of small globules, but notwithstanding this appearance, Swammerdam very judiciously observes, that "it is a matter of doubt whether the blood in the vessels has any globules, for when drawn from them, it may easily acquire that figure†," from which it is evident, that, though he was contemporary with Leuwenhoek, he was not convinced of the truth of this opinion.

\* Cavallo's essay, page 224.

† Swammerdam's history of insects, page 31.

There certainly is a great propriety in giving plates on such subjects, as it affords an opportunity of forming some opinion of what has been supposed to have been seen on these occasions, and without plates the descriptions would be unintelligible.

Mr. Chefelden, whose book was published about forty years after Leuwenhoek's supposed discovery, has given two plates of microscopic representations; but does not mention whether the plates were engraved according to his own directions, as descriptions of experimental evidence, or whether they were copied from others. The manner of conducting the experiments should have been minutely described, and the power of the microscope, and the method of exposing the objects to view, should have been explained.

To those, who are not well acquainted with the use of optical instruments, it may be necessary to mention, that the larger the magnifying power, the less will be the focal distance; in consequence of which, so large a body as the tail of a fish could not be examined with a glass of great magnifying power.

Microscopes are generally furnished with little glass tubes for this purpose, and in descriptions of the microscope we frequently meet with representations of these glass tubes with little fish in them, in the manner they are prepared for these experiments; and such descriptions make very pretty pictures, and may by some be thought to look well on paper, but in practice they only serve to amuse the credulous, or to impede the progress of inquiry.



If we separately examine these two plates of microscopic representation, one of which is said to resemble the circulation of the blood in the tail of a fish, the other the animalcules in semine masculino, and then compare the information separately taken, we shall find that these two conjectural representations will give the strongest evidence of the fallacy of these experiments. If we give credit to one, we must admit the other, and if we doubt the truth of one, they must both fall together. Thus, by comparing the result of two experiments, we may be enabled to form a better judgment of the accuracy of each, and to satisfy ourselves whether they are, or are not, representations of nature.

But I am perfectly satisfied without repeating them, and though my taste may be called in question, yet I must candidly acknowledge the want of relish for this species of philosophical investigation. But perhaps it might prove a more pleasing amusement to the younger student, who may be induced to repeat these experiments, to examine the truth of these representations, and try the evidence through the medium of his own senses.

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## THE VASCULAR SYSTEM.

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THE action of the vascular system is so immediately affected by a phlogistic diathesis, that this has generally been considered an important object in all investigations of the pathology of inflammation. The discovery of the circulation of the blood, and the explanation of its progress through

through the thoracic viscera, has without doubt established a basis for some very important improvements in the science of physic and surgery; but our knowledge of the animal functions is still imperfect. The mechanism of the vital powers is only seen in part, nor has the nature of morbid action been yet explained.

If we attentively examine the structure and mechanism of the vascular system, we shall find throughout the whole the most perfect order and simplicity; but if the arterial system was, as Mr. I. Hunter supposes, part formed of cylindrical tubes, and part of cones, the motion of the blood would constantly vary according to the diameter of the vessel; in a conical artery the motion of the blood would be slow at its basis, and increase in rapidity as the vessel diminished in diameter.

If anatomists had ever paid the least attention to the principles of hydraulics, they must have detected the inconsistency of such a system, and have examined the subject with more attention.

I shall not enter into a critical examination of all the observations respecting the elasticity of different parts of the animal body, but shall endeavour to shew that the contraction of the arteries depends on muscular action, and not on elasticity.

The manner, in which blood is discharged from a wounded artery, shews that their action is constant, but not regular; their powers of contraction always being in proportion to the degree of distention. They never relax except when they are perfectly empty, on the extinction of life, or the  
suspension

suspension of the vital powers, which circumstance proves, that the action of the arteries is muscular: for if their contraction depended upon elasticity, they would when empty continue in a contracted state.

Their distention does not depend on a relaxation of their muscles, but is affected by the operation of a superior power; the heart and arteries acting in opposition to each other, whilst the blood serves as a resisting medium. Mr. I. Hunter attempts to explain the difference between muscular motion and elasticity, and endeavours to point out the different parts of an artery subservient to each; but the action of the arteries will be best demonstrated by their natural operation and effects, and the mechanism of the vascular system most clearly illustrated by the phenomena of life.

Mr. I. Hunter has made choice of a different method, he has endeavoured a priori to explain the nature of muscular motion, and to investigate the structure and power of the arteries by dissection and experiment; but the inferences are not applicable, as there is no other instance of muscular action similar to that of the arteries.

It is not probable that any experiment, which can be made on an artery after death, can in any respect explain the power of its action during life; on this occasion the arteries have been removed from their natural situation, and cut in pieces for the purpose of ascertaining their powers by trying what weight a slip of an artery would support, and what power would tear them asunder; it is only necessary to mention these experiments, they do not require an answer.

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The experiments made many years ago by \*Dr. Hales, by fixing glass tubes into the carotid arteries of living animals, are more simple, and much better calculated to shew the power of the heart and arteries; but, after all, if we could measure the power of the heart and arteries, and the velocity of the circulating fluids with the greatest accuracy, still this is only one single part of a very complicated piece of mechanism, that will at most be imperfectly understood; and except we could trace the progress of the blood to and through the circumference of the circulation, this partial operation of its central power would contribute very little to our knowledge of the animal œconomy, either in a state of health or under the influence of disease.

For my own part, I have no opinion of this mutilated evidence of distorted nature; but it is possible that these arguments may appear of more importance to others than they do to me, and consequently merit our attention. As the sphincter muscles are circular, their mode of action is supposed to resemble the contractile power of an artery: but the sphincter muscles are subject to the dictates of volition, and in the description of this species of muscular action we meet with many inaccuracies.

In one place, †contraction is said to be the natural operation of the muscular power; in another we are informed, that the action of the sphincter muscles is both ‡voluntary, and involuntary, and that relaxation is another species of muscular action, and that this is involuntary.

\* Hales statical essays, vol. 2, page 40.

† I. Hunter on gun-shot wounds, page 100.

‡ I. Hunter on gun-shot wounds, page, 104.

The voluntary and involuntary contraction is afterwards made to consist of voluntary muscular action and of elasticity; in one instance sphincteric contraction is called contractile elasticity, but afterwards this is changed to a sustaining power by muscular contraction. Mr. I. Hunter then adds, "that the voluntary action of these muscles is greater than the involuntary\*;" I suppose he means that a powerful exertion of the contractile powers by the dictates of the will, is stronger than a less exertion of which perhaps we may not be conscious.

These different species of muscular action appear to me irreconcilable, and in what manner or degree they are applicable to the mechanism of the vascular system, will become the next object of our inquiry.

To sum up the whole of this description of voluntary and involuntary motions, we are then informed that the power of involuntary contraction commonly remains longer than the voluntary; and now we come to the application of all this preparatory reasoning, if so it may be called, to the action of the heart and arteries. He says, "thus the muscular action of the arteries is longer retained than that of the heart†." If we allow any connection in this statement of the argument, it is at once asserting that the action of the arteries is involuntary, and the action of the heart voluntary.

I do not object to the fact, that the arteries continue to act longer than

\* I. Hunter on gun-shot wounds, page 104.

† I. Hunter on gun-shot wounds, page 105.

the left ventricle of the heart from which they originate, but this will not be found to depend on any diversity of involuntary or voluntary action; the action of the heart and arteries are certainly both involuntary, and are both regulated by similar principles. In this instance the action of the arteries is supposed to be muscular, and no notice is taken of their elasticity; at the same time that every argument, which blind enthusiasm could devise, is brought forward to prove, that the contraction of the arteries depends on the co-operation\* of elasticity, and muscular action.

This union of powers is said to produce most wonderful effects; they not only contract the arteries, but also distend them†; but these actions do not preserve a general uniformity; for in one place we are told that the arteries are distended by the power of the heart, and contracted by elasticity, assisted by muscular action; but in the very next line ‡ the contracted state of the arteries is said to arise from the action of their muscular power. We are also informed that the arteries are § elongated by their muscular power. I have thought necessary to notice some of the most important parts of this embarrassed representation, as the circumstances, which gave rise to these conjectures, will in some degree contribute to illustrate this part of the subject.

\* I. Hunter on gun-shot wounds, page 109.

† "It may here be remarked, that the action of vessels is commonly supposed to be contraction, either by their elastic or muscular coats; but I have shewn that their elastic power also dilated them; and I have reason to believe their muscular power has a similar effect." I. Hunter on gun-shot wounds, page 278.

‡ I. Hunter on gun-shot wounds, page 117.

§ I. Hunter on gun-shot wounds, page 123.

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There are some circumstances that at first view may seem to correspond with the effects of elasticity; but, when the whole evidence is attentively examined, both in a state of action, and in a state of rest, by observing the various operations of the vascular system during life, and the appearances after death, that elasticity will be found to be the effects of muscular power.

The manner in which a stream of blood is discharged from a wounded artery evidently demonstrates, that the action of the arteries is increased in proportion to their distention. Thus when the arteries are in the extreme diastole, the velocity of the blood is greatest; and the velocity continues to diminish, during the succeeding systole in proportion to the degree of contraction, until the systole is terminated by a fresh supply of blood from the heart.

But when the supply from the heart is prevented either by a temporary suspension, or final termination of the vital powers; when under such circumstances the arteries have discharged their whole contents, they then become relaxed and their action ceases.

If then the contraction of the arteries depended on elasticity, as their final contraction is so complete as to discharge all the blood into the veins, they would after death remain in the same contracted state; "for it is to be remembered, that elasticity in animals does not, like muscular contraction, depend on life; an elastic body possessing that quality as perfectly after death as before \*."

\* I. Hunter on gun-shot wounds, page 106.

It is the operation of this elastic power that is supposed to counteract the muscular contraction, and this is particularly mentioned as a cause of their expansion\*; but if the arteries possessed a power of expansion independent of the pressure of the blood, the velocity of a stream of blood from a wounded artery would diminish during the operation of this expansive elasticity; and if the impetus of the blood coming from the heart was inferior, or only equal, to this elastic power, the blood would cease to move in a sound artery, or flow from a wounded one, during this part of their diastole. And whatever was the proportion of these two operations, the interrupted velocity of a stream of blood from a wounded artery would give evidence of its effect. So that I think it is evident that the arteries are neither expanded, nor contracted by elasticity, but that their contraction is muscular, which is counteracted by the power of the heart, the blood serving as a connecting medium between the two; for as the blood never ceases to flow from a wounded artery, so the arteries never cease to act so long as they are supplied with blood from the heart; but being deprived of all supply, they by their final contraction discharge their contents, which are received into the veins, and their action ceases.

If then the arteries never cease to act when the blood is present, and immediately become passive when their contents are discharged, it is evident that the cause of action depends on the presence of the blood; and as they are found empty and in a state of relaxation after death, their action during life must depend on muscular power; for if the power of elasticity does not depend on life, the arteries would not become relaxed after death.

\* "The contracted state of an artery arises from the action of the muscular power, and is again restored to the natural state by the elastic." L. Hunter on gun-shot wounds, page 117.



The vacuity of the arteries after death was particularly noticed by the first anatomists, long before the course of the blood was discovered, or the use of the arteries known. It was from this circumstance that the arteries first took their name; it being at first supposed, as they were found empty after death, that they only contained air during life, and were consequently considered conductors of air.\*

This circumstance is mentioned both by Boerhave and Haller, for the purpose of proving that the contractile power of the arteries is superior to that of the veins. And at the same time that the vacuity of the arteries clearly determines that part of the argument, I shall venture to give it as my humble opinion, which their relaxation proves with equal evidence, that the contraction of the arteries depends on muscular power.

It has long appeared very singular to me, that a fact of such importance should at the present day be so little noticed: for independent of any scientific views, it is also frequently necessary for the administration of impartial justice, that the natural appearances after death should be generally

\*“The name *Artery* is derived, (ἀπὸ τοῦ τ' ἀερα τρεῖν) from its containing Air; for the first Vessel thus denominated, was that we now call the *trachea* or Windpipe, the Ateries themselves being in the early Times of *Hippocrates* termed *beating* or *internal Veins*, in contradiction to the external Veins, which have no Motion. But after *Hippocrates*, the notion of *Erasistratus* prevailing, till it was refuted by *Galen*, that the Canals we now call Arteries, received a Quantity of Air in their diastole from the Heart, which they expelled in their Systole; these Vessels were from that Time named *arteriæ*. This Air they supposed the Arteries received from the left Ventricle of the Heart, which again took it from the Lungs; holding likewise, that the same Ventricle received but a very little Blood which transfused into it through the muscular Septum of the Heart. At that time they distinguished two Kinds of Air-vessels or Arteries, arising from the left side of the Heart; the one which we call the *Aorta*, they by way of eminence named *arteria arteriosa*; the other, which appeared to have the Structure of a Vein, they termed *arteria venosa*.” Boerhaave's lectures, vol. 2, page 3.

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known. And I cannot omit this opportunity of observing, that I seldom read an account of a dissection without noticing some such disgraceful instances of ignorance or inattention.

It is not necessary to produce a long catalogue of evidence in support of this assertion, as a single example will be sufficient. When Dr. Rat-tray gave his evidence on Capt. Donellan's trial, he supposed that the vacuity of the arteries after death was the effect of poison\*: but a professional man should certainly be well acquainted with the subject before he presumes to give an opinion, or if he has no opinion to give, it becomes a virtue to confess his ignorance; and this may always be done without the least impeachment either of his abilities as an anatomist, or understanding as a man.

For if after the most careful and attentive anatomical examination he is not able to discover any evidence to the contrary, it would certainly be right under such circumstances to give a general opinion, that the appearances were perfectly natural and void of all anatomical evidence whatever.

\* The Trial of JOHN DONELLAN, Esq.

Taken in short-hand by Joseph Gurney, page 32.

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Answer by Doctor RATTRAY.

"I believe the effects of poison is to empty the arteries in general and push the blood into the veins; that is my opinion at present, so far as I have gone into the matter."

In the medical transactions vol. 3, page 8, we meet with Doctor Heberden's account of a dissection of a man who died of an angina pectoris in which he observes "that the left ventricle of the Heart was remarkably strong and thick, and as perfectly empty of blood as if it had been washed."

It would be extremely illiberal to reflect on a physician for not understanding anatomy, but what must appear much more singular is, that, like Doctor Oquetos, they should not understand greek.

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The Heart, which is the origin of the circulation, is a muscular viscus, whose action is excited by the blood that is poured into the different cavities; for we find that, the instant the auricles are filled with blood, they both immediately contract and discharge their contents into the ventricles; the auricles then become relaxed, and the ventricles contract to propel the blood into the arteries, the right into the pulmonary artery, and the left into the aorta.

The ventricles, then, having lost their stimulus, instantly become relaxed and passive. The diastole of the heart is not a state of expanded dilatation, but only of passive relaxation. This differs very much from the nature of the diastole of the arteries during life; but after death the state of the left auricle and ventricle are perfectly similar to that of the whole arterial system.

The right side of the heart, which remains full of blood, preserves a state of tension after death, and the muscles that compose the left ventricle, having been in an active state when life terminated, continue in a contracted state afterwards. But the left ventricle, on the contrary, having by its last contraction discharged its contents, and thereby lost its stimulus to action, is always after death found relaxed and flaccid like the arteries; which clearly proves that their action depends on similar principles.

It is not improbable that a partial attention to this circumstance has induced Mr. I. Hunter to observe that "we very often find the heart large and flabby\*," but I suspect the statement to be inaccurate, and am of o-

\* I. Hunter on gun-shot wounds, page, 148.

pinion, that if he had viewed the subject in the light above described, he would have found that the right side of the heart would appear large, in consequence of being full of blood; and the left side flabby, because it was completely empty.

Whoever will attentively examine Mr. I. Hunter's observations on the action of the heart and arteries, will certainly find that he has incumbered the subject with many difficulties; but has ultimately left the whole undetermined.

I shall not attempt to reply to every little observation that we meet with in this long discussion; but the description, that he has given of the mechanism of the semilunar valves, will enable us to determine in what degree his anatomical opinions merit our attention. The semilunar valves are placed at the entrance of the aorta, for the purpose of admitting the blood from the heart, and preventing its return. The function of these valves is certainly one of the most plain and simple operations in the whole animal machine; they do not possess any power of action in themselves, but obey the pressure of the approaching and receding fluid, and operate only on mechanic principles; and yet this simple piece of mechanism has long bewildered anatomists of the first-rate abilities.

Dr. Mihles\* supposed that these valves regulated the power of the  
heart

\* "For, as the arterial valves at the heart, will admit of various apertures, the heart acts upon that hydraulic principle, whereby any force or pressure, ever so weak, by urging a fluid through an aperture, proportionably small, shall overcome any resistance, or raise any weight, ever so great. So that whenever  
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heart and arteries, on the principle of the hydrostatic paradox; but it is evident that he neither understood the hydrostatic paradox, nor the mechanism of the semilunar valves; and these valves have no active powers inherent in themselves, but move obedient to the momentum of the blood.

Mr. I. Hunter has added a new hypothesis on this subject, and has attempted to explain the action of the semilunar valves; and to guard against any mistake on the part of the reader, he has given diagrams by way of illustration; but notwithstanding all this caution, he has described the valves in an open state during the systole of the aorta, and closed during their diastole.

It is rather singular, that an anatomist of such abilities should deliberately commit such an irreconcilable mistake; it is not a mere verbal inaccuracy, but a regular system of argument founded in error; and what renders the whole more inexcusable is, that the diagrams, which were intended as illustrations, must to any unprejudiced mind have pointed out the inconsistency. He supposes that the three semilunar valves at the entrance of the aorta are, at the instant of its extreme diastole, brought into right lines; forming a triangle, whose outer angles correspond with the circular dimensions of the artery. It is not necessary to copy the figures, as a verbal description will be sufficient for our present purpose; and those who think necessary may refer to the original statement.

the arterial resistance is increased, or the muscular force of the heart abated, the valves of the heart are opened by a proportionably smaller column of blood; which, in a natural easy systole, is seldom more than half the contents of either ventricle; as in a natural easy expiration, the lungs seldom expel more than half their contained air. Haller's physiology by Doctor Mihles, vol. 1, page 97.

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He says, "figure the first shews the artery in its systole, with the three valves, nearly close to its sides. The two black dots are designed to represent the mouths of the coronary arteries now covered by the valves\*."

This description is too clear to admit of ambiguity, the aorta is in its systole, and the valves wide open. Let us here recollect what is the relative state of the left ventricle of the heart, and the arterial system. The very instant that the systole of the left ventricle ceases, the systole of the arteries takes place; and if the valves of the aorta did not close the instant that the systole of the arteries commences, the blood would be returned from the artery into the left ventricle; so that it is impossible that the valves should continue in the state here described, during the systole of the artery; and if it is remembered that a complete pulsation is performed in less than a second of time, we shall be convinced that the closing of the valves is a very expeditious operation: for short as the interval of time may be from the termination of the systole of the left ventricle to the commencement of the systole of the arteries, in that short interval the valves must either close, or part of the contents of the aorta be returned into the heart.

And the distress, which is occasioned by the imperfect action of the valves in consequence of ossification, and which was so particularly experienced by Mr. I. Hunter in his own person, gives us reason to conclude, that the operation of these valves is in general performed with perfect accuracy and effect.

\* I. Hunter on gun-shot wounds, page 161.

Mr. Cheselden says, "In a woman that died of a dropsy, I found the valves of the aorta quite covered with chalk-stones, which not suffering the valves to do their office, the left ventricle of the heart was constantly overcharged with blood, and distended to above twice its natural bigness\*." It is very difficult to form an accurate judgment of the perfection of the mechanism of these organs by an anatomical examination of their structure after death; but we may conclude that the different parts perform their functions completely, if we meet with no evidence to the contrary. Mr. I. Hunter observes that "the valves of the pulmonary artery do not do their duty so completely as those of the aorta; for in them we do not find the corpora-fesamoidea†." But instead of supposing that the valves of the pulmonary artery do not do their duty, because the corpora-fesamoidea are wanting, I should rather conclude that, in this instance, this particular structure of the valves is not necessary; at the same time, I see no reason for questioning the perfection of the mechanism, or the certainty of its effect; and the variety only proves, that they are necessary in one instance, but not in the other.

We now proceed to "figure the second, which shews the artery in its diastole, where the three valves run nearly into straight lines, making an equilateral triangle of the area of the aorta. But as their edges are rounded, and the bodies of the valves make a curve inwards, they by these means fill up in part this triangular space, and the corpora-fesamoidea fill up the other part. In this way the whole of the area of the artery is filled up‡."

\* Cheselden's anatomy, fifth edition, page 182.

† I. Hunter on gun-shot wounds, page 162.

‡ I. Hunter on gun-shot wounds, page 161.



The diastole of the aorta takes place in consequence of a fresh supply of blood being sent from the left ventricle of the heart; and as this quantity of blood must pass the semilunar valves, these valves must of necessity be open during the diastole of the arteries, and consequently it is impossible that the situation of the valves should correspond with this description during the diastole of the aorta. When the artery is in its diastole, the valves recede from each other; but if the expansion of the aorta was such as to extend the valves till they were brought into right lines, then the margin of the valves could not make a curve inward as is here stated; and if, at the utmost expansion of the aorta, the valves were sufficiently lax to make a curve, instead of approaching the centre of the artery as is here supposed, the curve would be directed towards the sides of the artery by the impetus of the blood; and if they were brought into right lines by the expansion of the artery, they could not close immediately on the commencement of the contraction.

It is therefore evident that they never are brought so much on the stretch as to prevent their complete approach to each other, even when the artery is in its full diastole; but that they open with the approaching current, and close to prevent its return; and instead of being formed into lines and triangles, will lie at liberty, loose and relaxed, floating in the stream.

The subject is plain in a state of nature, and easy to be understood; it is the explanation that is so particularly mysterious; and as for the statement before us, it displays the affectation of philosophy, and is a complete burlesque on mathematical demonstration.

Mr. I. Hunter seems to have been apprehensive of an objection to his own  
hypo-

hypothesis, which to me appears unanswerable; that is, that if the action of these valves depended upon their being brought into right lines, it would be necessary that the aorta should always possess the same degree of plentitude, and that its distention should always be the same. But after great losses of blood, when the arteries were less distended, these valves would not be brought into right lines; and as we have no reason to suspect the perfection of their operation, either in a full or exhausted state of the system, it is evident that the closing of the valves does not depend on their extension by the diastole of the artery.

As a protection against this objection, Mr. I. Hunter observes that "the quantity of blood that is just sufficient to keep the animal alive, is sufficient to distend the artery so as to shut the valves\*," but if the valves are to be brought into right lines, it will be necessary that the expansion of the artery should always be the same, or that the valves should be elastic, and admit of different degrees of distention.

We find after fainting fits, when the action of the heart and arteries has been for some time suspended, and the blood all accumulated in the veins, that the first perceptible pulsations, let them be ever so weak, are not imperfect, and in cases where this fainting takes place from considerable loss of blood, the evidence is particularly applicable to the point in question. Instances of this kind we frequently meet with in cases of uterine hæmorrhage, when the loss of blood is very considerable; yet if the pulse is examined under such circumstances, let it be ever so feeble, we do not meet with any evidence to induce us to suspect that the operation of the semi-

\* I. Hunter on gun-shot wounds, page 162.

lunar valves is imperfectly performed. And if I may presume to give my opinion in opposition to Mr. I. Hunter, I should think that the less the aorta was distended, the more the valves would be disposed to approach each other.

But it may here be proper to observe, that it is of no importance to the question before us in what respects my opinion may differ from that of Mr. I. Hunter; the question is, whether or no he has explained the animal functions with sufficient accuracy to establish a theory of diseases on first principles?

I am ready to acknowledge that a much more limited discussion would have been sufficient for this purpose; but the circulation of the blood is an important part of the animal œconomy, and certainly the observations of one of the first anatomists of the age, on a subject so particularly interesting and so imperfectly understood, must be thought worthy of attention.

We have now conducted the blood through the semilunar valves into the aorta, through whose branches it is distributed to all parts of the body. It is then taken up by the veins, and conducted by the ascending and descending cava to the right side of the heart. This progress of the blood has been long known, but the manner in which it moves through the arteries and the veins, and the principles that regulate its motion, seem yet to be but imperfectly understood.

The systole of the heart and arteries gives motion to the blood, but the distribution and velocity depend on the magnitude and form of the different parts of the arterial system.

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The first opinion that was formed on this subject was that the arterial tubes were of a conical figure, diminishing in diameter as they proceeded from their origination; in some few instances Haller suspected that they were cylindrical; but since that time I was of opinion that modern anatomy had decided the question, and determined that all the arterial tubes preserved the same diameter, except where they gave off additional ramifications. But on this subject I believe we have no written evidence to appeal to, and consequently we are under the necessity of admitting Mr. I. Hunter's opinion as a modern standard.

If on this occasion we meet with satisfactory evidence to prove that the arterial system is composed either of cones or cylinders or of a miscellaneous assemblage of both, it will be in vain to oppose speculative argument against plain matter of fact; but if, on the contrary, the experiments and observations should appear imperfect, I shall then consider the subject open to additional discussion, and claim the privilege of defending my own opinion.

Mr. I. Hunter supposes that "the arterial tubes are some conical and some cylindrical\*," but does not point out whether the large arteries are cones, and the small ones cylinders; or whether the small ones are cylinders and the larger cones.

He injected the carotid artery of a camel, and weighed two equal portions from each end of the artery after it was filled with injection, and

\* I. Hunter on gun-shot wounds, page 169.

found that the section of the upper end was one grain and a half heavier than that of the lower, from which we must infer that the upper end is largest.

If we examine the descriptions and engraved representations of former anatomists, who supposed that the arterial tubes were all conical, we shall find that in this instance the conical form of the artery is placed in a contrary direction.

As a proof of the accuracy with which these experiments were conducted, we are told that the artery was well warmed and placed in a horizontal position; but we are not informed whether it was taken out of the neck of the camel, or whether they were both warmed together, neither are we informed whether the application of heat was moist or dry, and all these in my opinion are circumstances of considerable importance; moist heat would relax these dead animal substances, but dry heat would contract them, and dry heat could not be impartially applied.

If the question had rested alone on this simple evidence, it would have been necessary that all these particulars should have been accurately noticed; but as the experiment is repeated, the fallacy of this opinion will be more easily detected. "The carotid artery of another camel, measuring three feet and a half in length, was found to send off forty-four small branches, about the size of the human intercostal arteries; with one as large as the ulnar. Of this artery, a transverse section of one inch in length, being taken from each end and weighed; that from the lower end was found to weigh two scruples, sixteen grains and a half; while that  
from

from the upper end weighed only two scruples, fourteen grains and a half\*."

Thus we find that the result of this experiment is quite the reverse of the former; in one the section of the upper end was one grain and a half heavier than that of the lower, in the second experiment the upper end was two grains lighter than the other. A third experiment was made, and we are told, that "the difference in weight between the upper and lower sections was five grains," but we are not informed which of the two had the advantage. "Similar sections from carotid arteries of a swan being weighed, the lower section was found to be three grains and a half heavier than the upper; the lower section weighing thirteen grains and a half." In this instance the upper end was the smaller, but we are not informed whether the carotid artery of a swan gives off branches, and the number and size should have been brought into the account. He then concludes with the following curious imagination; he says, "I imagine if the carotid artery in the camel did not send off any branch in its course, it would increase in size nearly in the same proportion with the umbilical artery, or the spermatic in the bull. It is to be observed, that as arteries divide they increase in size, much faster than if they did not†."

Such is the state of facts presented to the public on this occasion, from which it must appear that the form of the arteries has not yet been determined, or at least that the question cannot be decided on Mr. I. Hunter's evidence.

\* I. Hunter on gun-shot wounds, page 170.

† I. Hunter on gun-shot wounds, page 171.



In all descriptions of the circulation that I have met with, the principal object has been, to trace the course of the blood from the right side of the heart to the left; and this has been so frequently explained, that it would be an insult on those readers, who are already acquainted with the present state of the subject, to trouble them with a repetition. It is by the action of the arterial and venous system, that the blood is conveyed from the left side of the heart to the right, and this part of the subject I presume still remains enveloped in obscurity. If we view the arterial system after death, we may consider the whole as a set of tubes connected with each other, for the purpose of conveying the blood from the heart to all the different parts of the body. But when we attentively examine the vessels in an active state during life, we shall find that the arteries do not merely serve as passive conductors of the blood, but that the regularity of the distribution depends on the mechanism of the arterial system.

I do not here presume to reason against plain matters of fact, or endeavour to support an hypothesis against the evidence of nature; Mr. I. Hunter has already proved, that the facts are not plain and self-evident: I shall therefore beg leave to give it as my opinion, that the arteries are cylindrical, and endeavour to prove the necessity of their being so, because such a system of vessels will best answer the purpose of distributing the blood, and possesses the greatest uniformity and perfection.

For if the arterial tubes were all cones, the small ramifications branching from the sides of larger cones, the whole would form an irregular assemblage, which it would be impossible to reconcile with the simplicity of nature. It is the business of the arteries to convey the blood to all parts  
of

of the body, and to regulate the distribution according to the respective purposes; and it is also reasonable to suppose, that the mechanism of the arterial system must be such, as to give the least possible resistance to the first moving power, and preserve an uniformity of motion of the circulating fluids.

And if such is the simplicity of nature, it is necessary that the arteries should be cylindrical; for in all parts of a cylindrical vessel the blood would move with the same velocity; and as fluids press equally in all directions, the same impulse, with which the blood is impelled into any branch of the arterial system, will operate equally throughout the whole extent.

And if we divide the arterial system into parts, and class the ramifications according to their respective diameters, as the sum of the diameters of the branches exceeds that of the trunk from which they originate, the velocity of the blood will consequently diminish in proportion as the number of ramifications is increased.

This circumstance, which is universally admitted \*by all writers on the anatomy of the blood vessels, furnishes us with a satisfactory answer to the supposition, † that mortification sometimes takes place in the extremities,

\* "From what has been said it must appear that the arteries form a cone whose apex is at the heart."  
I. Hunter on gun-shot wounds, page 171.

† "Sometimes the fluids of the body are so vitiated as to lose their proper nutritious qualities, and the limb becomes gangrened, not from an Alteration of its Vessels, but chiefly from its situation, which being at a great distance from the Heart, will be more prone to feel the ill effects of a bad blood, than any other part, as the circulation is more languid in the extremities." Sharp's surgery, third edition, page 213.

in consequence of the languid state of the circulation, depending on the distance of situation from the heart. Whereas, on the contrary, I think it is evident that the diameters of the arterial tubes are so proportioned that the momentum of the blood is the same in all parts of the body, at the extremity of the arterial system; for we find every part equally supplied with blood, and nutrition and other vital functions as perfectly performed in the extremities, as in parts that are nearer to the heart.

The glandular system having been supplied, and the business of nutrition accomplished; we find a part of the animal fluids is then discharged as excrementitious by the excretory ducts of the skin and other organs of excretion, and the remainder is taken up by the veins to be conveyed back to the right side of the heart.

If we attentively examine the mechanism of the venous system, we shall find much instructive evidence, and important information. In the arterial system the progress of the blood commences at the centre and passes to the circumference; but in the veins the blood is collected by innumerable branches at the circumference, and conducted to the centre.

If the motion of the blood in the arteries and veins alike depended on the same cause, the effects would be the same: in the arteries the supply is at intervals, and the motion of the blood through the whole arterial system corresponds with the motion of the heart; but in the veins the motion of the blood preserves an uninterrupted regularity.

In cases of syncope, when the action of the heart is for a time suspended,  
and



and the arteries deprived of their supply, the arteries become completely empty, and the blood is all accumulated in the veins. This circumstance is evidently proved by \* the paleness of the face which takes place in consequence of the vacuity of the cutaneous arteries; and in ophthalmia, when the arteries of the tunica conjunctiva are morbidly distended, and rendered visible by inflammation, if the patient is bled until fainting takes place, the florid appearance of the vessels sinks away, and the tunica conjunctiva will appear as white as if the inflammation had never taken place. But this effect of bleeding is only of short duration, as the florid appearance will return as soon as the circulation is restored.

I do not introduce this instance as an illustration of the effects of general bleeding in cases of ophthalmia, though I am well convinced that it is the most efficacious; and that topical bleeding in such cases is an insignificant remedy. But it is to the evidence of nature that I wish to appeal; and without examples, the most ingenious arguments will be considered only as matter of opinion.

Mr. I. Hunter observes, "that the whole powers or materials of life, are called into the vital parts or citadel, and the out-works are left to themselves; and adds, that such is the case with fainting &c. &c." If the veins are supposed to form the citadel, and the arteries the out-works, the metaphor may then prove admissible; but the idea is erroneous, and the representation not consistent with the mechanism of the vascular system.

The power, with which the blood moves forward through the veins, is

\* I. Hunter on gun-shot wounds, page 317.

in some degree illustrated by the velocity of the discharge in venesection; and we find by the same evidence that the power of the contraction of the veins increases in proportion to their distention; but the power with which the veins contract is inferior to that of the arteries. The vacuity of the arteries after death has been noticed by some of the first writers on this subject and urged in proof of this opinion; but I think that the paleness of the face, and the disappearance of inflammation in the eyes during a fainting fit, may be considered as much more satisfactory, as in these instances we have an opportunity of observing these phenomena without the loss of life.

Respecting the cause of the motion of the blood in the veins, we meet with a difference of opinion; Mr. I. Hunter supposes that it depends on the power of the heart. He says, "the first cause of the blood's motion in a vein of a quadruped, is the force of the heart; for I think we must suppose that the heart can, and does carry on simple circulation\*." But Mr. I. Hunter seems apprehensive of the objection before stated; that if the motion of the blood in the arteries and veins depended on the same cause, we should meet with a similarity of effect; for he cautiously guards against the difficulty, by admitting the conclusion. He says, "I think it is probable, that where there is an universal action of the vascular system, the action of the arteries and veins is alternate, that when the arteries contract, as in many fevers, the veins rather dilate, more especially the larger†."

\* I. Hunter on gun-shot wounds, page 185.

† I. Hunter on gun-shot wounds, page 187.

Why a state of disease should have been made choice of as the most proper period for such observations, I am at a loss to conjecture, as the action of the vascular system is in all probability as universal in a state of health, as when under the influence of disease. But if the facts are as here stated, we must admit the inference; for reason and argument both lose their power, the question depending alone on the evidence of facts; and if the veins do not dilate and contract and pulsate like the arteries, we must then admit that the motion of the blood in the veins does not depend on the action of the heart.

Doctor Whytt examined this subject with considerable attention about fifty years ago, and he then endeavoured to prove \* that the power of the heart does not reach the extremities of the arterial system; to make up for this defect of power a new hypothesis was then brought forward, and the small arteries were supposed to be actuated by principles inherent in themselves. Which of these two high authorities must we then subscribe to? it is certain that they cannot both be in the right; but I dare not presume to give an opinion with equal confidence that they may not both be wrong, as it is much easier to invent an hypothesis than to investigate the mechanism of nature. Doctor Whytt has attempted to illustrate his opinion by a display of mathematical demonstration; but † he seems so well convinced of the misapplication, that it is not necessary I should now introduce any argument to prove the inconsistency.

But notwithstanding all that Doctor Whytt has said to the contrary, I

\* Whytt's works, page 225.

† Whytt's works, page 218.



am still of opinion that the power of the heart does extend to the utmost limits of the whole arterial system.

How the arteries terminate, or how the veins begin, are questions of very difficult investigation; it is a point beyond the reach of injections, and composed of parts too fine for the dissecting knife to divide. And when we consider that every part of the body is supplied with blood vessels whose number, if not infinite, is so great as to exceed the multiplication of ideas; we shall then cease to wonder that the microscope should represent this subject as a system of confusion. It is to analogy alone that we must appeal, and form our judgment by comparing the small and great together.

I shall not here revive the warm controversy that took place between the Hunters and Monroes respecting the absorbent system; but if the motion of the blood in the veins does not depend on the power of the heart, it certainly must depend upon some other cause; and I know of no animal function but absorption which is adapted to this purpose.

That the veins are more numerous than the arteries, is a fact that appears self-evident; and in favour of which, we have the concurring testimony of the author before us. \*If then the veins are more numerous  
than

\* "There is a greater number of trunks of veins in the body, than of arteries, at least visible veins: for wherever there is an artery, in common there is a vein; and in many places two, one on each side, which sometimes makes a kind of plexus round it; besides, there are many veins where there are no corresponding arteries, as on the surface of the body; for in the extremities many of the larger veins pass superficially; but those become fewer and fewer towards the trunk of the body. They are numerous

than the arteries, it is impossible that all the veins should be accompanied with corresponding arteries; and for the same reason, the arteries and veins cannot all unite by immediate anastomoses.

Mr. I. Hunter copies an observation from Dr. Hales, in which we are told, that the Doctor had seen a number of arteries throw their blood into one vein. In my opinion this is a subject that is invisible, and beyond the reach of microscopic investigation; but if true, it would prove that the blood escapes from the arteries before it is received into the veins; and consequently whether the arteries are more numerous than the veins, or the veins more numerous than the arteries, the blood must be taken up by the veins by absorption.

By the power of absorption the blood is not only first taken up by the veins, but it is also by the same power that the motion of the blood is continued through the whole venous system.

In the arterial system, the blood moves from the centre to the circumference; in this instance, it moves from the circumference to the centre. But when we have accompanied the progress of the blood into the venous system, it then ceases to be an object of attention by what power the blood was brought to this situation; whether it was by the power of the heart continued beyond the extremities of the arterial system, or whether it depended on a power of absorption that took place at the commencement of the veins. For the blood, once having entered the venous system, it

merous also in the neck of the human subject; but in some of the viscera, as the intestines, the veins and arteries correspond in number very exactly." I. Hunter on gun-shot wounds, page 183.

then

then must proceed on hydraulic principles, as there is no additional power, between the origin of the veins and their termination in the right auricle of the heart, that can in the least contribute to a general increase of the momentum of the blood through the venous system.

The lateral pressure of the circumjacent parts will produce a partial effect, but this is only temporary; and the loss of the motion afterwards will be in proportion to the temporary increase, as the blood cannot move forward with a velocity superior to the ratio with which it is received. It is impossible that more blood should be conveyed to the heart by the two cava than is received by the extremities of the branches.

We know that, in consequence of muscular exertion, the heart and lungs become incumbered with the accelerated motion of the venous blood; but this is only temporary, and the heart afterwards experiences a want of the customary supply. This irregularity may take place in a degree sufficient to produce a suspension of the motion of the heart, which may arise from two causes; in the first instance, from the accumulated blood, in the second, for want of necessary supply. For if the veins are in one instance emptied by the action of the circumjacent muscles, they will become relaxed when that pressure is removed, and must have time to fill before the regularity of the motion of the blood can be restored.

By way of illustrating the effects of this lateral pressure, let us suppose that a deep seated vein in one of the extremities is so compressed as to propel the contents beyond the next pair of valves; as soon as this temporary pressure is removed, this vein will become relaxed, and cease to transmit



transmit the blood forwards, until the distention and progressive power of its contents are superior to the resistance of the anterior column, whose pressure shuts the valves. And thus the valves do not promote the progress of the blood, they only serve as partial interpositions to prevent its return.

It has been before observed, that the arterial system preserves an equilibrium throughout the whole; but in the venous system the equilibrium of action is not so perfect; partial pressure from a variety of accidental causes may impede the progress of the contents of the veins; but when the muscles are at rest, whether the body is in an erect or horizontal position, the blood will move from every part of the circumference to the centre with equal velocity and power, the valves of the veins will float at ease, and neither increase nor diminish the passing stream.

It is the business of the valves to prevent irregularities taking place, and not to promote or direct the progress of the blood; they only serve as sentinels to preserve order and not as active agents. The active part of the venous system is limited to the extremities of their branches; and the venous tubes serve only as passive conductors to convey the blood from the circumference to the heart.

But it has already been shewn, by a multiplicity of evidence, that the contraction of the veins is much inferior to that of the arteries; so much so that under a variety of circumstances the venous system becomes so much expanded, as to receive the whole mass of blood; so that the two cava serve as reservoirs to supply the heart.

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As the power with which the veins contract is in proportion to their distention, this will increase in proportion to the plethoric state of the system; at the same time it is also probable that the action of the veins, as well as the arteries, increases under the influence of disease. From which it will be evident that the immediate effects of taking a quantity of blood from a vein in the arm, on the mechanism of the circulation, will be to diminish the plethoric state of the *venæ cavæ*, and consequently diminish the supply to the right side of the heart.

I have now attempted to trace the progress of the blood through the arterial and venous systems; and have endeavoured to point out some few operations of those vessels, that have previously passed unnoticed. But I am not so presumptuous as to suppose, that the subject is yet exhausted; or that it is in my power to give a perfect explanation of the mechanism of the circulation. It is a subject that beggars all description, and will at last be but imperfectly understood; we may trace the outlines, but the minutiae are not within our reach.

When the utmost anatomical ingenuity and address have been employed to investigate the form and structure of the parts; when the various operations of the sanguiferous system have been attentively observed in a state of health, and under the influence of disease examined with accurate attention; when the various authors who have written on this subject have been consulted, and their opinions compared with the evidence of nature; when every part has first been separately examined, and afterward assembled in one clear point of general perspective, so that the whole may be comprehended in one view: then, but not till then, the enlightened  
physiolo-

physiologist will be enabled to form a plausible conjecture on this subject. I shall therefore conclude, that if such are the difficulties with which we are surrounded, it will be in vain to attempt to establish a theory of disease on first principles.

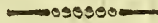
SECTION





## SECTION V.

### THE MODERN TREATMENT OF MORTIFICATION IN CASES OF GUN-SHOT WOUNDS.



THE merits of the preceding theory of inflammation have been so fully discussed, that it will not be necessary in the present instance to examine the first effects of external injury. I shall therefore proceed to the second period of disease, which includes the most dangerous and important consequences, and for which no rational method of treatment has yet been established.

The division of mortification into two species will not only enable us to form more accurate ideas on the nature of this disease, but will also, in a general view, add some very instructive information on the subject before us. This distinction is mentioned by Mr. J. Hunter in his treatise on gun-shot wounds, but is not pointed out as an object of much importance, nor is the least intimation given respecting the origin of the discovery; but this part of the subject is passed over, either as unworthy of our consideration, or as a fact already admitted, and generally understood.

No sooner had Mr. Pott pointed out the natural division of mortifica-

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tion into two species, but the writers on modern surgery exerted their utmost industry to restore the whole to its original obscurity.

Doctor Underwood has made four species of mortification\*, but his division will neither improve our knowledge of the disease, nor assist in directing the method of cure. The last cause that he mentions is dyscracy, but if he intended to represent this as a specific cause of a distinct species of disease, it would not have been necessary to have added, that the different kinds might all depend upon external injury. I do not pretend to deny that a certain degree of external injury would not be more likely to terminate in mortification when connected with a bad constitution, than with a good one; but that disease which is the effect of external injury should have been considered independent of any other circumstances; and when the state of the constitution becomes the cause, as is so particularly exemplified in the mortification of the toes and feet, if we admit this new theory, we shall find that the rational distinctions of Mr. Pott must sink into obscurity.

The description that Mr. Pott has given is an accurate representation of nature, but the hypothesis before us is composed of a pompous assemblage of words without any rational signification. These observations are said to have been written for the improvement of the younger student, but in my opinion the maturity of experience will not be able to assimilate this theory with the evidence of nature.

\* "Gangrenes may be distinguished into four kinds; such as arise from irritation, attended with more or less inflammation; from an inflammatory diathesis of the system; from general debility; and from dyscracy, to each of these species external injuries may give rise, or become the remote cause." Dr. Underwood's surgical tracts, page 277.



If Doctor Underwood intended to allude to the mortification of the toes and feet, when he mentioned dyscracy as a cause, he should have expressed himself in intelligible language; or if his object was to point out any new species of disease, he should have illustrated his theory by examples.

In cases of mortification where the bark did not succeed, the vitriol. cærul. and spirituous cinnamon water are recommended, but with what views or at what periods of the disease this composition may be given with the greatest probability of success, are circumstances that remain undetermined. He mentions an instance\* where the bark failed, and this composition was afterwards given with success; and that the salutary powers of the vitriol may appear unquestionable, we are informed that the disease repeatedly re-appeared in returning to the bark, and was as often stopped by returning to the vitriol.

This is a species of argument frequently made use of by the advocates for new medicines; but why either a physician or surgeon should return to an inefficacious medicine, when he has met with one whose powers have shewn more salutary influence, I shall not presume to determine.

In one place opium is said to have been productive of mischief when prescribed without due discrimination, but it is afterwards recommended in a phlogistic diathesis, in company with bleeding, purging, and saline

\* "I once saw a remarkable instance of this in a large spreading sphacelus, which was immediately checked by it, after the largest doses of the bark had failed; and repeated re-appearances of the gangrene upon returning to the bark, as often stopped by returning to the vitriol." Dr. Underwood's surgical tracts, page 284.

draughts.

draughts. But as Doctor Underwood informs us that the indiscriminate use of opium has been more attended to by Mr. I. Hunter than any other writer on this subject, we may there expect to find more satisfactory information.

If the two kinds of mortification, that are mentioned by Mr. I. Hunter, are the same that were first distinguished by Mr. Pott, the inaccuracy with respect to the remedies appropriated to each disease will render the whole subject unintelligible. In one instance opium is supposed to be the only remedy, and the bark a useless medicine; but in the account before us, \* bark and opium are both indiscriminately recommended, as general remedies in every species of disease.

In one place we are told, that † mortification is of two kinds; the one without inflammation, the other preceded by it. The first, I suppose, is the mortification of the toes and feet, the latter that which is the consequence of external injury. In another place our author observes, that “inflammation often produces mortification or death in the part inflamed:” and then adds, “this commonly takes place in old people that are become very much debilitated, and chiefly in the lower extremities ‡.” This passage to me is absolutely unintelligible; for if by mortification of the extremities our author means that of the toes and feet, this description must be considered inaccurate. || The mortification of the toes and feet is not

\* I. Hunter on gun-shot wounds, page 9.

† I. Hunter on gun-shot wounds, page 8.

‡ I. Hunter on gun-shot wounds, page 274.

|| Pott on the mortification of the toes and feet, page 149.

preceded

preceded by inflammation, and is not peculiar to old age; and yet, if we attentively examine the whole paragraph, we shall find that it is the mortification of the toes and feet which is here alluded to; but it is evident, that the writer has expressed himself as if he studiously endeavoured to disguise his knowledge of what Mr. Pott had previously said upon this subject.

In the first section of mortification, we are informed that his \*observations are to be limited to that kind of mortification which is preceded by inflammation; but whether we attend to the description of the disease, or the method of treatment, we shall find the whole crowded together in a promiscuous assemblage of unintelligible confusion. But admitting that it is to that species of disease which is preceded by inflammation, that our attention is on this occasion directed; I shall now examine what information is to be obtained respecting the method of treatment.

In the first place Mr. I. Hunter supposes, that "in inflammations which terminate in mortification, there is no increase of power, but, on the contrary, a diminution of it;" and then adds, "it is plain, from the common practice, that the weakness has been attended to; but it is plain that the increased action has been overlooked; and, therefore, the whole aim has been to increase the action in order to remove the weakness. The peruvian bark, *confectio cardiaca*, *serpentaria*, &c. have been given in large quantities, as the case appeared to require, or the constitution could bear; by which means an artificial or temporary appearance of strength has been produced, while it was only an increased action."

\* I. Hunter on gun-shot wounds, page 8.



If I can draw any inference from these observations, it is that the bark, *confectio cardiaca*, and *serpentaria*, are either improper or inefficacious medicines in cases of mortification, because they only give \*an artificial, or temporary appearance of strength, which was only an increased action.

But in the very next page he changes his opinion, and without offering either reason or argument in justification of this conversion, asserts that, "upon the principles here laid down, the bark is the principal medicine, as yet known, that we depend upon, as it increases the powers and lessens the degree of action." In one page the bark is said to be improper, because it only produces a temporary appearance of strength by increasing action; but in the next page it is said to produce a contrary effect, for there it is asserted to increase the powers, and lessen the degree of action.

Here let the candid reader pause, and review the subject before he determines the question before us. Let him open Mr. I. Hunter's book and examine †these two pages with critical attention; and if he can form a more satisfactory opinion from the data before us, I shall be happy to be convinced of the error of my opinion, and with gratitude acknowledge the superiority of his professional accomplishments.

The explanation that is given of the effects of wine and opium is equally obscure. When opium was first given as a remedy in mortifications, it was not directed either with a view of lessening action, or giving strength,

\* I. Hunter on gun-shot wounds, page 9.

† I. Hunter on gun-shot wounds, page 8 and 9.

but

but for the purpose of easing \*pain. That species of mortification, in which opium is supposed to be so particularly efficacious, is sometimes extremely painful; but whether it is only under such circumstances that opium proves a useful remedy, it is not necessary on this occasion to determine. It is sufficient for our present purpose to recollect, that it was in this particular species of disease, and solely for the purpose of easing pain, that it was at first administered; but it is now recommended in every species of mortification, and under all circumstances without distinction.

Mr. I. Hunter observes that "Upon many occasions opium will be of singular service, by lessening the action; although it does not give real strength†;" but the particulars of these occasions are not explained. If I might presume to give my opinion, I should have supposed that opium and wine would be productive of somewhat similar effect, but Mr. I. Hunter was of a contrary opinion; he says, "cordials and wine upon the principle on which they have been given are rationally administered; but there are strong reasons for not recommending them, arising from the general effects which they possess of increasing action, without giving real strength‡." Thus we find that cordials and wine are improper because they increase action; and bark was supposed to be productive of similar effects: the

\* "The pain in the foot and ankle was so great, and so continual, as totally to deprive the patient of sleep. On this account, and merely to procure some remission, I gave two grains of opium at night which not having the desired effect, I repeated it in the morning. Finding, during the following day, some advantage, I repeated the same dose night and morning for three days; at the end of which time the patient became quite easy, and the appearances on the foot and ankle were visibly more favourable." Pott on the mortification of the toes and feet, page 154.

† I. Hunter on gun-shot wounds, page 9.

‡ I. Hunter on gun-shot wounds, page 8.

medicinal



medicinal powers of opium, are supposed to be very different from those of bark, or wine, consequently it may be an efficacious remedy.

But notwithstanding this diversity of powers, bark and opium are both indiscriminately recommended, as proper medicines in cases of mortification.

This species of mortification that we are here treating of, is that which is preceded by inflammation; and though it is the consequence of inflammation, yet I expect it will be generally admitted, that the cause and consequence form two different kinds of disease.

The inflammation is strongly marked with increased action, and requires such remedies as will destroy this morbid stimulus, and reduce the action of the system to the healthy standard; but the instant the first crisis takes place at the commencement of mortification, the increased action ceases, and the vital powers begin to sink under the debilitating influence of the disease.

It is at this critical period that bark and cordials become necessary, and there can be no doubt respecting the propriety of giving bark and cordials at this period of the disease; the most important question will be, whether it is in the power of medicine to resist its progress.

In the directions for the \* treatment of the constitution in cases of gun-

\* I. Hunter on gun-shot wounds, page 563.



shot wounds, we meet with some observations on the effects of bleeding; but in many instances these observations are obscure, and in some they are unintelligible. In one place bleeding is strongly recommended, in another we are told that this remedy is to be used with the greatest caution. Topical bleeding is also recommended on the parts already in a state of inflammation, but we do not meet with many powerful arguments in support of these opinions; and as these opinions may by some be thought rather singular, they should have been both protected and explained.

The subject is certainly of importance, as this is a very powerful remedy in cases of inflammation; I shall therefore endeavour more fully to explain the effects of bleeding in a separate section. It is asserted that \* “a man will bear bleeding better after an amputation of the arm than the leg; better after a compound fracture of the arm than the leg, he will bear bleeding better after an injury done to the head, chest, the lungs &c. than either the arm or leg;” and all this is given without the least explanation in support of it. And what application can be made of these observations, either in a scientific or practical view, I am at a loss to conjecture. It is not a question which will bear bleeding best, but which will require it most; and for my own part I am of opinion, that bleeding will be very rarely necessary in cases of amputation.

In another part of this work we meet with a case in point, that very strongly militates against the necessity of bleeding in cases of amputation. He says, “Mr. Foot was relieved of a head ach of long standing, by the

\* I. Hunter on gun-shot wounds, page 564.

loss of a leg; but he afterwards died of a complaint in his head, very similar to an apoplexy\*. I have no doubt but a person of inferior abilities, and less conversant with the effects of amputation, would have formed a very different opinion on this subject. He would not have discovered, that the loss of a leg was such an efficacious remedy for an head ach of long standing; but it is probable that, with much more humble inference, he would have supposed that the loss of blood and subsequent abstemious regimen might for a time correct the plethoric state of the system, and remove the pain in the head; and this seems to be evidently proved by the event, as we find that a happy restoration to health and returning luxury was the unquestionable cause of returning disease. If therefore bleeding was necessary, it was after the cure of the leg was accomplished, and not immediately after amputation.

It may be proper here to observe that bleeding, bark, and opium, are the principal remedies that are recommended in cases of external injury, such for instance as gun-shot wounds; but under what circumstances, or

\* I. Hunter on gun-shot wounds, page 332.

Happy for our learned author that Mr. Foot had quitted the stage, before this work was presented to the public: but if he had not died the case would have been less complete. It would certainly have afforded a rich harvest for his pen, and might have given birth to a new devil upon two sticks, by once more converting his satanic majesty into a bottle conjurer; on which occasion our hero might have been brought forward to great advantage. The present time would also have been particularly propitious, as the rising of the college of surgeons, like that of pandæmonium, might have furnished the young Genius with a Throne. And as the superseding of an act of parliament by letters patent would provide a subject for legal controversy, a great law Lord, who is certainly well acquainted with the merits of the question, might have been added to the drama, whose splendid abilities would have decorated the scene, whilst his profound knowledge and sound judgment might have explained and determined the Letter of the Law.



to what degree these respective remedies are to be made use of, is not explained.

Bark is said to be ordered indiscriminately in cases of gun-shot wounds, and the last paragraph in Mr. John Hunter's book furnishes us with ample evidence in support of this assertion. He says, "Bark is greatly recommended in gun-shot wounds, and with good reason; but it is ordered indiscriminately to all patients that have received such wounds, whatever the symptoms or constitution of the patient may be\*." This is certainly an improper method of giving the bark or any other medicine, as it is only under particular circumstances corresponding to the powers of the respective remedies, that medicine can be given with advantage. But if Mr. J. Hunter disapproves the indiscriminate use of the bark by others, his own observations on this subject are not less objectionable than those of his predecessors. He strongly recommends the bark in cases of inflammation, not only when the inflammation is gone off, but also in the time of inflammation. In one place the bark is recommended as the principal medicine as yet known in cases of mortification, in the last page of the book we are told that "there is no better medicine for wounds in general, during the whole progress of inflammation;" we must therefore either admit, that inflammation and mortification are similar species of disease, or that, if they are opposite diseases, the same remedies are proper in both instances, or that one of these statements must be erroneous.

If the reader will attentively examine, in the introduction, the chapter on mortification, he will find a want of distinction between the cause and the effect.

\* J. Hunter on gun-shot wounds, page 565.



In the treatment of the constitution in cases of gun-shot wounds, we meet with a similar want of distinction with respect to the remedies: he says, "the bark and gentle bleeding when the pulse begins to rise, are the best treatment that I know of in inflammations, that arise either from accidents or operations." If on this occasion I should presume to give my own opinion, I should assert with equal confidence that bark and bleeding are two remedies that are incompatible with each other. When bleeding is necessary, bark is not only improper, but inadmissible; and in such cases where bark is indicated, bleeding must on a certainty prove prejudicial. But if we compare Mr. I. Hunter's introduction with the concluding page, the want of uniformity of opinion and connection of argument will satisfactorily prove in what degree these speculative doctrines merit our attention.

Thus we first began with noticing the indiscriminate use of the bark as mentioned by Mr. Bromfeild, and have proceeded to Mr. I. Hunter's observations on the same subject; and as the indiscriminate use of the bark was the last object of his attention, and as the subject still remains clouded with such unintelligible obscurity, it is reasonable to conclude that this question has not met with a due share of public attention, or that the imperfections in this part of the practice of surgery have not been yet corrected.

The plan of external treatment will have equal claim to our attention; and as this part of the subject is within the limits of ocular inspection, it has been thought by some to be less difficult of investigation, more capable of improvement, and already advanced to a higher degree of certainty,

ty, and perfection. But here, as in every other department of medicine, a knowledge of the animal œconomy is equally necessary; without which it will be impossible to understand the nature of disease, or to form a rational opinion of the operation and effects of chirurgical applications.

If we examine the sentiments of former writers on this subject, we shall meet with a general uniformity of opinion in favour of warm applications in cases of mortifications; but Mr. I. Hunter is of a contrary opinion, and concludes his observations on this subject by asserting that, "all applications should be cold\*." If we are to depend alone on this concluding sentence we must certainly give up the long established practice of warm applications, and adopt the use of cold ones; but if we attend to the previous argument, which was intended to pave the way for the introduction of this hypothesis, we shall find some reason to question the propriety of this new method of treatment.

In the same page we are told that "warm fomentations have been applied, as being congenial to life; but warmth always increases action, and, therefore, should be well adjusted to the case; for on the other hand, cold debilitates, or lessens powers when carried too far, but at first lessens action." If warm applications are congenial to life, and we do not on this occasion meet with any argument to prove the contrary, we must then acknowledge the propriety of this practice: and if, as is here asserted, cold debilitates or lessens powers, and at first lessens action, for these reasons cold applications must certainly be improper; so that we find the

\* I. Hunter on gun-shot wounds, page 9.



conclusion in direct opposition to the arguments that were intended to support it.

I shall not pretend to assert that long established custom is of itself a sufficient argument to support any mode of practice that is, on clear and evident principles, proved to be erroneous. But in such instances where the dictates of philosophy are obscure, we might with some propriety appeal to the salutary influence of this long established practice in favour of warm applications.

Warm and cold are indefinite expressions, and it is necessary that we should distinguish between the two extremes, and regulate our practice by some rational principles; the particulars of which I shall not now examine, as it is not so much my intention in this place to defend any one system of practice, as to prove the imperfections of the present state of the subject.

If we attend to the evidence of experience, we shall find that, in such cases when the degree of inflammation and tension were considerable, warm applications have in general diminished the painful symptoms, and at least procured temporary relief. In violent contusions either with or without fracture or dislocation, the agreeable effects of warm applications are too evident to admit of doubt\*. In cases of inflammations of the bowels the warm bath is a remedy that is always had recourse to, and seldom fails in the worst instances to procure some relief from pain, so long as the

\* "Warmth and moisture act in many cases as sedatives to our sensations, although not always; and the distinction between those where they give ease, and where they rather give pain, I have not been able to make out." I. Hunter on gun-shot wounds, page 512.



patient can bear the application. Perhaps Mr. I. Hunter would in such cases have preferred a cold bath to a warm one, but on this occasion the almost unlimited confidence with which he was favoured might have found its bounds, as it would have been highly necessary to convince the patient of the propriety of the measure, before he submitted to a method of treatment so repugnant to the dictates of his own sensations.

But there is a case of inflammation of the bowels that frequently ends in mortification, where cold applications may perhaps be made use of with advantage. The instance I now allude to is strangulated hernia, but here the particular circumstances should not pass unnoticed; if the application of cold produces salutary effects in such cases, it is not by abating the inflammation, but by diminishing the bulk of the inclosed flatus, and by that means abating the tension of the parts, and though the relaxation may be momentary, still during that short interval the hernia may be returned.

I do not mention the application of cold in this instance, as a method I should myself make use of in common cases, or as a practice that I should in general recommend; I only notice this occurrence of circumstances for the sake of explaining in what cases cold applications may be made use of with safety, and sometimes with success. This is certainly an inflammation of the bowels, and an instance that frequently ends in mortification; but the inflammation connected with hernia bears no analogy to that without it. These concurring circumstances not only change the nature of the disease, but also require a different method of treatment and produce very different consequences, though the ultimum may in some respects prove the same.

In

In inflammations of the bowels without hernia, purgative medicines may be given with almost unlimited freedom, but when this disease is the consequence of strangulated hernia, purgative medicines should be given with the greatest caution. When inflammation of the bowels without hernia ends in mortification, death is the inevitable consequence; but in cases of hernia it frequently happens that the disease is limited to the parts, that the integuments and contents of the hernia will all slough away, and the patient afterwards recover.

But if we examine the influence of cold applications in other kinds of mortification, on the basis of Mr. I. Hunter's own argument, we shall not find the result favourable to this new opinion. The progress and particular period of the disease are certainly objects of great importance; the last stage of inflammation, immediately antecedent to mortification, we may suppose the most critical, and is the period that I should point out as most proper for the examination of this question. At this time the vital actions, which had been excited by inflammation far above the healthy standard, must now be considered as sinking fast to that degree where all the vital powers must cease.

Warmth we are told increases action, and if it is the business of the surgeon by external means to support the sinking powers till nature can be roused by internal medicines to co-operate, we must admit that warm applications have the preference. Every observation that we meet with, and every argument that is brought forward in support of this new doctrine, directly militates against it. He says, "stimulants likewise are improper where the actions are already too violent\*," for which reason in this in-

\* I. Hunter on gun-shot wounds, page 9.

stance where the actions are too languid, as our author acknowledges that warmth increases action, it must consequently be considered a proper application at this period of the disease.

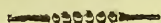
Let us now consider that Mr. I. Hunter was at the head of his profession, that his treatise on the blood, inflammation, and gun-shot wounds, is the latest and most extensive work on this subject that surgery has to boast of; and as, in addition to a multiplicity of other arguments, it still remains a question, in what manner, and under what circumstances, bleeding, purging, bark and opium should be made use of; and whether warm or cold applications have the preference; I hope I have satisfactorily proved, what I at first asserted, that there is no established method of practice, or public opinion on this subject.





## SECTION VI.

### THE DISTINCTION BETWEEN LOCAL INFLAMMATION, AND A PHLOGISTIC DIATHESIS, WITH AN EXPLANATION OF THE EFFECTS OF BLEEDING IN INFLAMMATORY DISEASES.



**I**NFLAMMATION is one of the first important consequences of external injury. In cases of wounds or contusions of the head, chest, or abdomen, the circumstances vary according to the situation of the parts, and the degree and extent of the disease: but injuries of the extremities are in general less complicated, and we may there trace the progress of inflammation, in the integuments, muscles, &c, independent of any visceral affection.

Let us suppose the case in question to be a violent contusion of one of the lower limbs, either with or without fracture; and that such is the degree of injury, that there is reason to be apprehensive that mortification may be the consequence. Under such circumstances, if amputation has either been neglected or disapproved, the first object will be to prevent the increase, and diminish the degree of inflammation; and if possible to terminate

minate this part of the disease by what is termed resolution. For this purpose, a great variety of remedies has at different times been made use of, and certainly much may be done both by internal medicines and external applications; I shall first examine the plan of internal treatment.

The most powerful remedies that rational experience has discovered, for the cure of inflammatory diseases, are bleeding, purging, saline medicines, nitre, and emetic tartar. The first two will in many cases claim the preference, but if these are to be made use of with the greatest advantage, careful observation and very accurate discrimination will be necessary to determine the time and quantity of each.

There is one kind of inflammation in which bleeding is particularly efficacious, I mean that kind, which is productive of a fizy state of the blood, such as in the integuments is termed erysipelas, in the membranes and ligaments acute rheumatism, in the brain phrenitis, in the lungs peripneumonia, in the liver hepatitis, &c, &c. This species of disease is certainly the same in all these instances, with respect to the general state of the system; and only differs with the situation, according to the nature of the parts that are principally affected. But whatever may be the situation of the disease, the method of treatment is the same, and must be regulated by the degree of disease, independant of the situation.

In cases of external injuries of the extremities, the inflammation that takes place is not perfectly similar to that species above described; it does not occasion a fizy state of the blood. Erysipelas and rheumatism are truly inflammatory diseases, and are productive of fizy blood, and all the pheno-



phenomena of inflammation, though seated on the external parts, as much so as any visceral disease; whereas the inflammation that takes place, in consequence of injury to the external parts of the body, does not produce fizy blood, and as it differs in its nature, it consequently requires a different method of treatment. If then, the disease that takes place in consequence of external injury to the extremities, does not produce fizy blood; I shall infer that bleeding will not prove equally efficacious in this species of inflammation; I do not assert, that bleeding may not in such cases be made use of with safety, and in a plethoric state of the system it may be productive of considerable advantage; but I wish to be understood, that it will not producethose salutary effects, as in other instances of inflammatory disease. Cases may occur where injuries of this kind are attended with a fizy state of the blood, but then it is to be understood that this may be an accidental concurrence, and not a natural consequence of the injury. The blood might have been in a fizy state before the accident took place, as subjects in a state of previous inflammation are no more exempt from accidents than those in perfect health.

Inflammation may take place, and proceed to mortification, and if bleeding be once or twice repeated during the rapid progress of this disease, I have always found that, if the blood is not fizy in the first instance, it will not become so in the second or third; which is contrary to the phenomena that we have frequent opportunities of observing in cases of general inflammation of the system.

In the latter instance, I know no limits to the use of the lancet short of a salutary termination of the disease; but in the former, bleeding does not appear to me a proper remedy, and should be used with the greatest  
H h caution;

caution; for if bleeding is carried too far, the inflammatory symptoms and the energy of the system will both sink together, and the rapidity of the approaching mortification be increased in some proportion corresponding to the preceding evacuations.

Inflammation of the extremities from external injury may produce mortification. And inflammation may take place in any of the contents of the belly, in consequence of external injury; and this is also equally liable to end in mortification; but still there is a material difference in these two species of disease; in the former, the blood will not be fizy, and bleeding will sink the vital powers, instead of destroying the disease; whereas, in the latter instance, the blood will be fizy, and very copious bleeding will be necessary, and is on this occasion a very important and certainly efficacious remedy. For the sake of distinction, the first case may be considered local inflammation, and the increased action systematic fever; whereas the latter is not only an inflammation of the viscera, but also a general inflammation of the system.

In many instances of fever, where the pulse is hard and full, a single bleeding may be made use of with advantage, merely to correct the plethoric state of the system, but can seldom be repeated with safety. It is in true inflammatory diseases that bleeding is so particularly efficacious; in simple fever and in many other cases, where it is indiscriminately made use of, it can only be looked upon as a doubtful auxiliary; but in true inflammation it is a specific antidote. It is only in those diseases that produce a fizy state of the blood that bleeding is so particularly salutary; an inflammatory disease may exist without a fizy state of the blood, but a  
fizy

fizy state of the blood cannot exist independant of an inflammatory disease; this state of the blood is the consequence \* and not the cause of the disease.

I have carefully attended to the progress of the inflammatory symptoms in cases of active hæmorrhage, and, being apprehensive of the approaching paroxysm, have taken away a large basin of blood, which has not shewn the least appearance of size; and I have frequently met with instances of this disease, where the hæmorrhage has taken place in less than an hour after I had bled the patient. I have under these circumstances immediately repeated the bleeding, and found the blood taken by this second operation strongly marked with size; in many instances I have found the returning hæmorrhage, and the fizy state of the blood, so regularly accompany each other, as if the fizy state of the blood was the immediate consequence of the discharge.

In the year 1768 † Doctor Heberden presented some queries on this subject to the college of physicians, which were published in the medical transactions in the year seventy-two. In the year seventy-one, Mr. Hewson published his experimental inquiry into the properties of the blood; but neither of these great men has satisfactorily determined the point in question. Dr. Heberden says, "the more we know of the human body, the more reason we find to believe, that the seat of diseases is not in the

\* Hewson's experimental inquiry, page 65.

† Medical transactions, vol. 2. page 505.

blood;



blood; to the sensible qualities of which they seem to have very little relation."

Mr. Hewson seems to have been of a contrary opinion; he in his preface observes, that "an inquiry into the properties of the blood, it is presumed, will be thought in a particular manner interesting, since there is no part of the human body upon which more physiological reasoning is founded, nor any from which more inferences are drawn for the cure of diseases."

I have thought fit to contrast these two opinions, for the purpose of invalidating the influence of authority; as it is the evidence of nature and voice of reason which should decide. I shall not attempt to reply in full to the queries of the one, or critically examine the experiments of the other, either of which would furnish materials to make a volume; but I cannot agree with Doctor Heberden, that the fizy state of the blood is an object of no importance. He observes that this appearance is not constant or regular; I have already given my opinion, that it is the consequence and not the cause of inflammation: for which reason the disease must necessarily take place previous to this appearance in the blood; but if inflammation takes the lead, it seldom exists long without producing this effect. I am ready to acknowledge, that it frequently happens that the first blood that is taken in inflammatory cases has not this appearance; and certainly, if the first bleeding removes the disease, a second will not be necessary; but if the disease is not abated and still continues to increase, there can then be no question about the propriety of a second bleeding, even if the first blood had not the fizy appearance. But if the first

first or second has this appearance, the next question is how far we must proceed, I answer, until we have destroyed the disease; and this may happen before the fizy state of the blood ceases. But I have frequently continued the use of bleeding after the fizy state of the blood has disappeared, where an increase of symptoms has the next day induced me to bleed again, and the blood has been strongly marked with size. I well remember an instance of this kind, it was a case of acute rheumatism; I had bled my patient twelve times, the last of which had not the least fizy appearance; the symptoms increased the second day after the twelfth bleeding, I took away about a pound more blood which was strongly marked with size, the disease in consequence subsided, and the patient rapidly recovered. Now this I consider a complete answer to Dr. Heberden's queries; he says "if one repetition of bleeding be indicated, (by the fizy appearance) will not its continuance plead as strongly for a second and third, and where shall we stop?" The answer is obvious, for if bleeding is the remedy, and the disease continues, the same remedy must be repeated until the disease ceases; I did not hesitate to bleed because the last blood was not fizy, nor did I continue to bleed because the thirteenth bleeding was strongly marked; but I ceased to bleed, because the disease subsided, and it was no longer necessary.

Sydenham observes, that he seldom cured a pleurisy with less than the loss of forty ounces of blood; but I think it is a question of more importance, to what extent bleeding may be continued, and what quantity may be taken, in desperate cases, with a rational probability of success: and this is a subject of such delicacy, that in all probability it will never be exposed to public view; as it is, in my opinion, what words cannot describe.



If a patient complains of violent pain in the side and is gasping for breath with laborious respiration, the indications are too plain to admit of doubt, and in such cases it would not be difficult to prescribe a plan of treatment for the first twelve hours; but the disease may continue for a week, or ten days, and as the treatment must be regulated by the particular circumstances of the case, it would be impossible to lay down any rule, how frequently bleeding should be repeated, and what quantity should be taken; it is certainly a matter of opinion, and every one must be left to judge and determine for himself; and it is the masterly exercise of this discretionary judgment, that distinguishes the man of superior abilities, and marks the merit of the professional character.

If the propriety of bleeding be generally admitted in one species of inflammation, it is frequently doubted in others; and as we sometimes meet with what may be justly considered a complication of disease, where an inflammatory state of the system and local inflammation of a different species both exist at the same time; these circumstances will increase the difficulty of the question. I have already mentioned the general inflammation of the system and the inflammation from external injury; and have endeavoured to shew how these may be connected, I shall now, by way of illustrating the general principles of this theory, notice a third kind, which differs from them both, I mean the gout; and as the propriety of bleeding in gouty cases is generally doubted, this subject may furnish some instructive information.

The manner, in which Mr. I. Hunter expresses himself on this subject, deserves our particular attention; he asserts that bleeding with leeches almost



most immediately relieves the gout; but afterwards he observes, without any additional explanation or distinction with respect to the method, that "it is not meant here to recommend bleeding in this disease \*."

This is at best leaving the subject in an unsettled state; and, as a general prejudice has long prevailed against bleeding in gouty cases, I shall endeavour to explain under what circumstances it may be made use of with safety and advantage. Perhaps it may be thought by some, who are partial to topical bleeding, that the use of leeches is here recommended, and the lancet disapproved. But as the gout does not produce a fizy state of the blood, or increase the action of the vascular system, like erysipelas, or acute rheumatism, or any other true phlogistic disease; the want of analogy in the nature of those diseases must induce us to suspect, that bleeding will not produce the same salutary effects in the gout, as it does in phlogistic diseases.

When the gout is seated in the extremities, without being connected with any general morbid affection of the system, I am well convinced that the less medicine is prescribed the better; for the gout is a disease that is naturally disposed to exhaust its own powers, but for which we have no remedy.

The materia medica does not possess any specific that will destroy the gout; nor are we possessed of any plan of treatment that will

\* I. Hunter on gun-shot wounds. page 338.

diminish the gout in any manner similar to that by which bleeding and purging will correct other species of inflammation.

But if we have no antidote for the gout, we are amply furnished with a variety of remedies for those diseases that are frequently connected with it, which not only interrupt its progress, but very much impede its salutary termination. For instance, if the gout is connected with fever, it is always right that this fever should be destroyed; but a much more important connection that we frequently meet with is, gout and a true phlogistic diathesis of the system; under such circumstances, bleeding and purging are not only safe and efficacious remedies, but often absolutely necessary for the preservation of the life of the patient. For I never met with a case, of what is called gout in the head, that was not attended with a phlogistic diathesis and fizy blood; a question then arises whether this disease in the head is purely gouty, or whether the gout, which may have quitted the extremities, is under such circumstances suspended by the superior influence of another disease.

That we may form an intelligible idea of this complicated state of disease, it will be necessary to consider how one morbid action will influence or suspend another. This is a subject that is particularly noticed by Mr. I. Hunter, and boasted of as a new discovery; he has given an example of the measles having first got possession of the constitution, and suspending the progress of the small pox: but the case is not without a precedent, and the doctrine is not new, as we meet with a similar instance in the Edinburgh Medical Commentaries of a more early date; and with respect to the laws of the animal œconomy, on which this morbid contest is supposed



posed to depend, it is a subject that may be traced back to the time of Hippocrates\*, and is a principle in animal nature that influences the operations both of the body and mind. I shall not attempt to determine whether Horace had studied Hippocrates, but as his works are more generally read than those of the old greek physician, I shall beg leave to add his authority in support of the antiquity of this doctrine†.

The two cases of the small-pox and measles are so particularly analogous, that I cannot forego the satisfaction of giving a copy of each, that the reader may form his own opinion on the subject ||.

This

\* Δύο πόνων ἄμα γινόμενων, μὴ κατὰ τὸ αὐτὸν τόπον, ὁ σφοδρότερος ἀμαυροῖ τὸ ἕτερον.

Cum duo dolores simul oborti minime eundem locum occupant, vehementior alterum obscurat; Hippocrates Aphor. lib. 2. No. 46.

† Emovit veterem mire novus; ut solet, in cor

Trajecto lateris miseri, capitisque dolore:

Ut lethargicus hic cum sit pugil, et medicum urget. Horatii sat. iii. lib. 2. l. 28;

### || CASE of SMALL-POX and MEASLES, by JOHN HUNTER.

“On thursday, the sixteenth of May, one thousand seven hundred and seventy-five, I inoculated a gentleman's child, and it was observed that I made pretty large punctures. On the Sunday following, viz. the nineteenth, he appeared to have received the infection, a small inflammation or redness appearing round each puncture, and a small tumor. On the twentieth and twenty-first the child was feverish; but I declared that it was not the variolous fever, as the inflammation had not at all advanced since the nineteenth. On the twenty-second a considerable eruption appeared, which was evidently the measles, and the sores on the arms appeared to go back, becoming less inflamed. On the twenty-third he was very full of the measles; but the punctures on the arms were in the same state as on the preceding day. On the twenty-ninth the inflammation increased, and there was a little matter formed. On the thirtieth he was seized with fever. The small-pox appeared at the regular time, went through its usual course, and terminated favourably.” See treatise on gun-shot wounds, page 5.

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This law of the animal œconomy is so clearly illustrated by many ingenious writers long before Mr. John Hunter's time, and exemplified by daily experience, that it is not necessary on the present occasion to give any additional explanation; the principal object is, whether the instance before us does or does not apply. If this question be considered in a theoretical light, it will certainly appear surrounded with many difficulties; but in a practical one, the solution will not be difficult.

Let us suppose the gout to have quitted the extremities, and an increased action of the system to have taken place, attended with violent pain in some of the viscera. I contend that the gout may exist in the extremities to any degree without producing increased action of the system, or a fizy state of the blood; but no sooner do the viscera become affected, than the action of the system is immediately increased, and the blood taken under these circumstances is marked with size.

The PROGRESS of the SMALL-POX RETARDED by the MEASLES,

by Dr. MANGET, PHYSICIAN at GENEVA.

"In the month of February 1772, I inoculated a child according to the Suttonian method. The eruption appeared on the seventh day. Altho' the weather was very cold, the boy remained in general in the open air, as he found it relieved him from the anxiety which accompanied the eruption. After two days of variolous fever, a new eruption appeared perfectly distinct from the former. This I soon discovered to be the measles. I then advised he should no longer be exposed to cold air. But from his impatience under confinement this was not complied with. The measles, however, kept out well; and about the end of the fourth day, terminated by desquamation, without any bad consequence. It was remarkable, in this case, that the suppuration of the small-pox, which had begun before the measles appeared, was totally suspended, and did not again renew its course till they were finished. By this means, the continuance of the small-pox was prolonged about four days beyond the usual period of that disease." See Medical Commentaries, vol. 1, page 317.

Now

Now one idea is, that the gout is transferred from the extremities to the viscera; if so, I then contend that it produces a phlogistic diathesis of the system, and bleeding and other antiphlogistic remedies become necessary. A second idea is, that, the whole constitution being in an irritable state, genuine inflammation takes place which suspends the gout, and, the inflammation being destroyed by a liberal use of antiphlogistic remedies, the gout is left at liberty to resume its former situation.

I well remember several cases of what is generally termed the gout in the head, in which I have succeeded by taking away a large quantity of blood from the arm, whilst the patient was sitting with his legs in a vessel of warm water; I have known immediate relief take place in consequence of the bleeding, and the patient describe the progress of the disease from the head to his feet. In such cases I have always found bleeding an efficacious remedy; and whether the metastasis of disease produce the inflammation, or the inflammation suspends the disease, it is the existence of visceral inflammation which dictates the antiphlogistic treatment. I do not pretend to say which is cause or which effect; but I am well acquainted with some gouty subjects who are taught by repeated experience to understand the effects of bleeding, and they are always apprehensive of submitting to the lancet, or taking a cooling purge, for fear it should occasion a fit of the gout.

The celebrated Doctor Brown bears testimony to the truth of this phenomenon, though he seems to have formed a very different opinion respecting the manner in which the medicine produces the effect\*. But if  
the

\* "The diffusible stimuli are so powerful in removing the inflammation of the gout, that sometimes, strong



the gout is an inflammatory disease, and if diffusible stimuli possess the power of increasing the action of the system, it is not probable that such remedies should prove salutary medicines in gouty cases. And as it is by many supposed that the gout is the offspring of intemperance, and that the same cause from which it first originated will not only serve to prolong its existence, but will also increase its powers, if these opinions are well founded it will be irrational to suppose that diffusible stimuli can be made use of with success for the purpose of its destruction; and it would be as difficult to account for the cure of the gout by the use of wine, and spirits; as to explain its propagation by a dose of glauber salt†.

But if intemperance is admitted to be productive of this disease, it is equally rational to suppose that other species of inflammation may depend on similar causes.

In the present instance it is most probable that the gout was not a solitary disease; for as Doctor Brown had long experienced the effects of diffusible stimuli, and ultimately died a martyr to the cause; inflammation of different kinds might have repeatedly taken place, and the viscera also

strong liquors as wine, and spirits, or spirits diluted with water, as warm as can be borne have in a few hours removed the most violent fit, and restored the use of the affected foot. The same remedies are of equal efficacy in removing the general symptoms." Brown's elements of medicine, by Beddoes, vol. 1, page 216.

† "It must be observed, that, as every directly debilitating power is an exciting hurtful means of bringing on any asthenic disease, so the effect of every evacuation and particularly that by the belly, is well known to be a certain means of bringing on a fit of the gout. Among many other means of inducing that disease a single dose of Glauber's salt, though that be but a mild cathartic, will bring a fit of the gout on me at any time." Brown's elements of medicine, vol. 1, page 217.

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have been considerably affected, and, at the critical period above-mentioned, a phlogistic diathesis might have taken possession of the whole system; by which the gout was overpowered and its action consequently suspended. But when the phlogistic diathesis was reduced by a dose of glauher salts, the gout then becoming the superior disease would display its powers. Under these circumstances the liberal use of strong liquors would increase the phlogistic diathesis, and the gout, being an inferior disease, would consequently sink into obscurity.

Instances of this kind very frequently occur, where the gout and a phlogistic diathesis meet in opposition to each other; and in general the symptoms of inflammation are erroneously attributed to a gouty origin.

If the lungs are slightly inflamed, the disease is said to be a gouty cough, and though such cases are frequently attended with a plethoric state of the system, yet bleeding and purging are thought to be equally improper. In inferior instances of disease, where sometimes the cough and sometimes the gout will alternately prevail, the general prejudice against bleeding and purging is so great, that it rarely happens that any regular plan of treatment is complied with; and if the pulmonic affection and phlogistic diathesis spontaneously subside, the gout is then set at liberty, and a regular fit of the gout in the extremities is the immediate consequence. But if the inflammation goes on increasing, a true peripneumony frequently takes place, and the action of the gout becomes suspended by the general influence of a superior disease.

When the symptoms are become so truly formidable, I suppose that

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then it is not probable that we should meet with a difference of opinion respecting the method of treatment; but as an apology for the free use of the lancet it will be said, that we have got a new disease. It is only in slight cases where blind prejudice can exercise her doubts; but if we depend alone on the evidence of Doctor Brown, the method of practice will appear plain and rational; and as bleeding and purging are the most powerful remedies in pulmonic inflammation, by these remedies we shall be enabled to remove the most powerful disease, and then the gout being set at liberty may exhaust itself.

I do not pretend to say that bleeding is an antidote for the gout, but I never can suppose that bleeding can create it; if then the gout takes place in consequence of bleeding, if this evacuation does not create the gout, it must set the gout at liberty, that previously existed in the constitution, by removing a superior morbid affection.

It is rather extraordinary that Mr. John Hunter, who delighted in theoretical speculation, should, when he was treating on the gout, have neglected such a favourable opportunity of gratifying a leading passion. He has given his idea of the principle, under the title "of diseased actions as being incompatible with each other \*;" and if his observations are conformable to the laws of nature, the gout, under such circumstances, must be suspended, and not transferred. He says, "It appears to me beyond a doubt, that no two actions can take place in the same constitution, nor in the same part at one and the same time; the operations of the body are similar in this respect to actions or motions in common matter."

I. Hunter on gun-shot wounds, page 3.

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If this ingenious writer had reflected for a single moment, he must have immediately recollected many instances to the contrary. When a body is suspended by the attraction of cohesion, or of magnetism, the power of gravity is not destroyed; or if he had recollected the course of projectiles, he would have met with an example where matter obeys the direction of two separate laws; or if he had directed his attention to the system in which we move, he would have found that the matter of the universe is suspended in the medium of two distinct and separate powers. His observations on this occasion are therefore all erroneous, and the analogy is inapplicable; but from motives of respect to the high opinion that the public had formed of his abilities in natural philosophy, I shall now attempt to make his own illustration the basis of my reply. The measles and small-pox may both exist in the constitution at the same time; and the measles, acting with superior influence, suspends the small-pox, but does not destroy them; not even during the interval of their suspension.

The example from the medical commentaries is much more satisfactory than the instance described by Mr. I. Hunter; in the former the small-pox had been out for two days, and the suppuration had begun, before the measles made their appearance; we are not told that the small-pox disappeared, their progress was suspended, and they continued in the same state. In the latter instance, the child was taken ill on the fourth day after the inoculation for the small-pox; and the measles appeared on the sixth day, which was previous to the commencement of the small-pox fever, and whilst we might consider the infection as perfectly local: but, in both cases, the progress of the disease seems evidently suspended. In like manner, inflammation does not destroy the gout, it only suspends  
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its action, and both exist in the constitution at the same time, but the superior influence claims precedence.

If the prejudice against bleeding in gouty cases was only limited to a few obscure individuals, these observations would have been less necessary; but when vulgar errors are sanctioned by such high authority \*, they then deserve attention. If bleeding is always improper in gouty cases, the danger should be pointed out; but if this evacuation is frequently proper, and sometime necessary, it is then right to defend the practice by explaining its effects.

Under the present state of the public opinion, it would be a bold undertaking to attempt to bleed a gouty patient; and if any one of this description should be so unfortunate as to have taken possession of rather too large a portion of the good things of this life, and to have loaded his constitution above the healthy standard, if immediate relief was ever so necessary, it must not be administered; for such is the refinement of modern practice, that I believe many would think it much more safe for their professional reputation to permit the vital powers to sink under the accumulated burden, than to presume to relieve the blood vessels with a lancet, or clear the bowels with a purge.

Bleeding is frequently made use of in common practice as a remedy for plethora; and the propriety of the method is seldom questioned. In cases of fever without inflammation, it may sometimes prove of advan-

\* Mr. John Hunter says, "it is not meant here to recommend bleeding in this disease." See gunshot wounds, page 338.

tage, at a very early period of the disease, to diminish the plethoric state of the system by a single bleeding; but if there is no inflammation, a single repetition would be improper, as it would hazard the reduction of the energy of the system without any rational prospect of advantage.

I do not consider bleeding a proper remedy either for plethora, gout, or fever, it is only in inflammatory cases that its salutary influence is so particularly conspicuous. But if inflammation is connected with plethora, gout, or fever, the connection even with gout does not forbid the use of bleeding, but, on the contrary, every instance increases the necessity.

In plethoric habits independent of disease, the relief by bleeding is only temporary, and the disposition to plethora is increased by the remedy.

Purging operates in a very different way; in the first instance it empties the intestinal tube, and other parts of the abdominal viscera partake of the evacuation; it stimulates the excretory glands into action, and unloads the system through the natural emunctories; whereas bleeding empties the system without exciting action, except that the loss being immediately perceived by the constitution, the organs of nutrition may experience an increase of appetite, and the lacteals be induced to act with additional avidity, and the evacuating system, at the same time, from the want of stimulus become more lethargic.

The most salutary method of regulating the equilibrium of the constitution will be by observing a due proportion of temperance and exercise,

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but if the accumulation should so far exceed the healthy standard that reduction becomes necessary, it is evident, that if bleeding is the most expeditious remedy, it is productive of the least permanent advantage.

SECTION



## S E C T I O N VII.

### THE PRINCIPLES OF TOPICAL BLEEDING DEMONSTRATED, AND THE INEFFICACY EXPLAINED.



**B**EFORE the discovery of the circulation of the blood, it was more difficult to form an opinion what would be the effects of bleeding on the sanguiferous system, or to estimate how far its influence might extend. It is now near two centuries since this discovery was revealed to the public; and even at the present day it is not yet determined, whether the effects of bleeding are limited to the parts near to that from which the blood is taken; or whether its influence is equally distributed to all parts of the system.

If eight ounces of blood be taken away by the lancet, this is termed general bleeding; but if the same quantity be taken away by cupping, or leeches, its effects are then supposed to be limited to the part, and this is called topical bleeding.

If we were to estimate the effects by the quantity independent of any other consideration, it would then be a matter of indifference what method was made use of, and that would deserve the preference which was most  
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convenient. But if the expedition, with which the blood is evacuated, be found to increase its salutary influence, then the lancet will prove the most efficacious; and this opinion is so clearly established on the evidence of general experience, that I believe none of the advocates for topical bleeding will presume to assert, that they would depend alone on either cupping or leeches in a truly phlogistic disease, in preference to more copious and expeditious evacuations by the lancet.

In cases of violent inflammation, where a short space of time is to decide the fate of the patient, and where the success depends, not only on the powers of the remedies made use of, but also in a great measure on the expedition with which they are administered: it certainly would be highly irrational to depend on the precarious sucking of a leech, or the tedious operation of a cupping glass; where any quantity of blood, that the urgency of the disease might be supposed to require, could be taken in a few minutes by a single puncture of a vein in the arm. It is rather singular that Sydenham, who appears to have been so well acquainted with the effects of bleeding, should have supposed that, in cases of pleurisy, bleeding was more efficacious when taken from the arm on the painful side; for, as he practiced and wrote subsequent to the time of Harvey, it is reasonable to suppose that a man of his abilities would have been too well acquainted with the course of the circulation to have retained such an irrational prejudice.

The choice, once given to different veins according to the seat of the disease, is now I believe but little attended to; as bleeding in the cephalic vein, in diseases of the head; and this is a species of topical bleeding  
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that would have been supported by success in practice. It would be bleeding in the arm, which is the most convenient and efficacious method that is made use of; as this species of bleeding will most expeditiously diminish the supply to the heart, and may be extended to any quantity, and repeated as often as necessary. It is wrong in principle, but right in practice; whereas the other kinds of topical bleeding, made use of for diseases of the brain, are not only wrong in principle, but inefficacious in practice.

When anatomy had discovered that the cephalic vein had not the supposed connection with the brain, the practice gradually sunk into obscurity. Leeches and cupping are both still used for visceral inflammation; but if we attempt to trace the connection between the external parts from which the blood is taken and the internal, which are the seat of the disease, we shall not discover any more immediate connection than between the cephalic vein of the arm and the internal parts of the head.

In addition to leeches and cupping, bleeding in the temporal artery is frequently made use of in affections of the brain; and as this is the only instance of arterial bleeding that modern practice \* presumes to sanction, this part of the subject may with propriety be first determined.

In this method of topical bleeding, several of the preceding objections are avoided; as the evacuation may be made to any quantity, and with considerable expedition, but cannot be so frequently repeated as bleeding

\* It may here be necessary to inform those, who have not read every ridiculous book that has been written on this subject, that, some years ago, an Arteriotomical Quixote attempted to open the carotid artery.



in the arm; for, when both the temporal arteries have been opened, the practice is at an end. And as diseases of the brain frequently require more than twice, or even thrice or four times bleeding, we must then have some other method to apply to. But independent of these considerations, bleeding in the arm appears to me to be the most efficacious; for if the object of bleeding be to diminish the power of the heart, and the impetus of the circulation, it is reasonable to suppose, that our object will be best obtained by diminishing the supply to the fountain head; whereas, by opening the temporal artery, we only cut off one of the distant branches.

I am ready to acknowledge that the quantity of blood, taken from the temporal artery, will diminish the plethoric state of the constitution; but I contend that it will not either so effectually or so expeditiously diminish the action of the arterial system. For as the blood is discharged from a wounded artery by the contraction of the whole arterial system, these vessels will, during the evacuation, adapt themselves to the quantity, and consequently their power of action will not be diminished in proportion to the loss of blood. Whereas, by diminishing the supply of blood to the heart by an evacuation from the veins, the main-spring of the circulation will be deprived of part of its power, and the action of the heart and arteries instantly abated; by one method we attack the source of action, by the other we only in a single instance destroy the effect.

But the vicinity to the seat of disease is supposed to point out the temporal artery as a part, from which the evacuation may be made with the most advantage. It will be impossible to form a rational opinion on this part of the subject without a previous knowledge of the anatomy of the vascular

cular system, and the mechanism of the circulation; and at the same time it will be necessary to consider, how far the distribution of the blood depends on hydraulic principles; for this is the only basis on which any rational argument can be founded, and the centre whereon the question ultimately must turn.

The temporal artery is a branch of the external carotid, which supplies the external parts of the head with blood; the internal may be considered as a corresponding branch that conveys the blood to the internal parts of the head, and ramifies through the brain.

These two branches differ in dimensions; and, in a state of health, the quantity of blood sent to each will be in proportion to their respective diameters. Now let us consider what will be the consequence of opening a branch of the external division; if the resistance to the progress of the blood be not diminished by opening the temporal artery, the distribution to the different vessels will continue the same, but if the resistance to the progress of the blood be diminished, the increased supply of blood to the external carotid will be in such proportion, that the increased velocity may correspond in an inverse ratio with the diminished resistance. But the most important question is, from whence must this increase of quantity proceed, and whether the distribution to the internal carotid will be diminished in proportion as the supply to the external is increased.

We must here recollect, that, according to a well known law in hydrostatics, fluids press equally in all directions; and, consequently, their distribution cannot be partial; the quantity that passes the internal carotid

tid will still be in proportion to the diameter of the vessels; and the additional quantity that passes the external carotid, in consequence of the diminished resistance, will be furnished by the original trunk of the carotid artery.

For as there is no division in the whole arterial system by the interposition of valves, as there is in the veins, every part of the arterial system will contribute to the supply.

But if any doubts should arise respecting the propriety of this statement, I am ready for the sake of argument to admit, "against my better judgment," that the distribution to the internal carotid will be diminished during the discharge of blood, in proportion to the increase to the external ramification; still the practice is equally objectionable. For if the quantity sent to the brain would be diminished for a few minutes, whilst the blood was flowing from the temporal artery, as this branch must be obliterated by the pressure necessary to stop the discharge, consequently the quantity of blood sent to the internal carotid after the operation would be increased in a much greater proportion than it was before diminished; for, as the temporal artery would no longer receive either the increased quantity or natural proportion, an additional supply of blood would be sent to the brain during the subsequent progress of the disease.

But if we attend to the conduct of those who pretend to approve this method, we shall find that they do not depend on arterial bleeding for the cure of diseases, but prescribe it on certain occasions, perhaps for the purpose of giving an air of importance to their practice; for if they considered



ed topical bleeding to be more efficacious than the common method, they would begin with it and continue it through the whole progress of the disease. If bleeding in the temporal artery in diseases of the brain be more efficacious than bleeding in the arm, and a second evacuation be thought necessary, this operation should certainly be repeated; and when both the temporal arteries have been opened, leeches and cupping might still be made use of; but if topical bleeding be prescribed only for the purpose of giving a pleasing variety to the method of treatment, one operation of opening the temporal artery, a single application of the cupping glass, or leeches, will be sufficient to support the parade of practice; and if the parties are amused and the dignity of the profession protected, the science of medicine and the life of the patient may both sink into obscurity together; the former undeserving of our consideration, the latter as unworthy our concern.

It is not necessary that I should demonstrate the efficacy of bleeding in the arm in all cases of true inflammatory disease; it is a subject sufficiently established on the authority of indisputable facts, and the evidence of experience; and if topical bleeding had been found by the same evidence of superior efficacy, it would certainly by this time have become the general practice, and bleeding in the arm have lost its reputation.

Whatever was written in favour of topical bleeding, before the time of Harvey, must sink under the discovery of the circulation; and all the subsequent arguments that I have met with seem to have been formed without any attention to the mechanism of the vascular system, as much so, as if the animal body was considered similar to a sponge, and the blood passed from one part to another by inorganic pores.

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But as the blood is sent from the heart to all parts of the body by the arteries, and is brought back to the heart by the veins, the immediate consequence of bleeding must therefore be to deprive the heart of part of the returning blood. And whether the blood is taken from a large vein by a lancet, or from a small one by a leech, in this respect the effect will be the same; but if, according to what I believe is the general opinion, the effects on the constitution are increased by the expedition with which the evacuation is made, that method should be preferred by which the largest quantity of blood is taken in the shortest space of time. In inflammatory affections of the brain, lungs, or liver, as the external veins have no immediate connection with the internal parts, the only effects of topical bleeding must be to prevent the return of a certain quantity of blood to the heart, and consequently cannot produce any particular effect as a topical application.

Mr. John Hunter seems sufficiently apprehensive of the difficulty of defending the doctrine of topical bleeding by the laws of the circulation, and has endeavoured to illustrate the propriety of this practice on very different principles; and as his authority deservedly stands high in the opinion of the public, I shall now proceed to examine some of his observations on this subject.

He asserts that topical bleeding produces the \* greatest effect with the least loss of blood, but has not given a single argument in support of his opinion. Now this appears to me contrary to the evidence of daily experience; for if a pound of blood be taken away from the arm in a few minutes, fainting is frequently the immediate consequence; but if the same

\* I. Hunter on gun-shot wounds, page 340.

quantity be taken away gradually by leeches, or cupping, the vessels have time to contract themselves, and the loss is not perceived. I am well aware, that his object was to produce an effect on the diseased part without influencing the constitution; but to support this opinion it would have been necessary, that the probability of producing such effects should have been explained.

Mr. I. Hunter carries the idea of topical bleeding far beyond his predecessors; the object was to bleed in external parts for the purpose of removing internal disease; but now bleeding is recommended in such external parts as are in a state of inflammation. This I consider a violation of what ought to be respected as one of the most sacred laws in surgery, not to add injury to a part already in a state of disease. We are told that "commonly little irritation follows the wound of a leech\*," it will be candid on this occasion to suppose, that these humble branches of surgery were beneath our author's notice; but I have frequently seen very extensive inflammation from the bite of a leech, and have repeatedly met with instances where large ulcerations have taken place, that have continued for three weeks or a month before they were completely healed; and I should presume, these would not prove a very salutary addition to a fractured limb, or an agreeable companion in a fit of the gout; in which topical bleeding is recommended.

In the treatment of gun-shot wounds he says, "it is often of service in the time of inflammation to bleed in the part with leeches or by punct-

\* I. Hunter on gun-shot wounds, page 340.



ures with a lancet \*;" this is a new species of topical bleeding and deserves our serious attention. I should consider it a very dangerous experiment to puncture a part with a lancet already in a high state of inflammation; and at the same time I cannot conjecture what would be the advantage; if we consider it as a method of evacuating the vessels of the part, it would not answer our expectations. If a scarificator with sixteen lancets was made use of, the quantity of blood discharged would be very insignificant if cupping glasses were not afterwards applied; and I should think that the danger of increasing the inflammation would far exceed every rational prospect of advantage. In cases where the inflammation is inconsiderable, it would certainly be imprudent to do more than necessary; and when the inflammation is very great a few punctures with a lancet might occasion a sloughing, and this endanger the loss of the limb, and perhaps determine the fate of the patient. It appears to me a speculative opinion that has never yet been put in practice; for if he had ever tried the experiment, he should have favoured the public with a few histories of its success.

Topical bleeding is recommended in the gout; but this method of puncturing with a lancet is not mentioned, and leeches have the preference on this occasion.

When we are informed that bleeding with leeches in the gout immediately eases the pain, the success is a sufficient argument in favour of the practice; but notwithstanding this good effect, our candid author immedi-

\* I. Hunter on gun-shot wounds, page 564.

ately adds a caution, that it is not meant here to recommend bleeding in the gout. But if it is a useful remedy why not recommend it, or if he intended to recommend bleeding with leeches in the part, and to disapprove bleeding in the arm with the lancet in gouty cases, why not express himself in intelligible language, and distinguish between the two? Whatever may be his opinion of general bleeding, it is evident that he approves bleeding in the part affected, and yet his own theoretical observations plead against his practical advice, as he acknowledges that the pain in the gout does not depend on the distention of the vessels, and if the object of topical bleeding be to evacuate the vessels of the part, in such instances we must in consequence infer that it cannot be necessary.

In one place he observes \*that the effects of bleeding cannot be explained on mechanical principles, yet admits the mechanical influence before he concludes the sentence. But for the purpose of avoiding all these difficulties, a new hypothesis is then brought forward; the fulness of the vessels is no longer referred to as a part of the disease, nor the evacuation taken into the account as a salutary effect of bleeding. And as this new theory is not regulated by the laws of the circulation, all arguments, that might be founded on the anatomy of the vascular system, cease to demand attention.

The powers of sympathy are then brought forward in full force, and

\* "If considered in a mechanical light, as simply lessening the quantity of blood, it cannot account for it; because the removal of any natural mechanical power, can never remove a cause which neither took its rise from, nor is supported by it: however, in this light it may be of some service; because, all the actions relative to the blood's motion will be performed with more ease to the solids when the quantity is well proportioned." I. Hunter on gun-shot wounds, page 345.

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topical bleeding explained on the principles of contiguous sympathy. The skin of the abdomen is supposed to sympathize with the liver, stomach, and bowels, and the lungs with the integuments of the chest. He says that, "in affections of the lungs bleeding opposite to them is of service; but in such cases it is not clear where the inflammation is; for if in the pleura then it does not act upon this principle but by continued sympathy \*."

In the first place, I deny the facts, and do not admit that bleeding near the part produces any effect as a topical application. In cases of peripneumony, or pleurisy, if topical bleeding was alone made use of, and the lancet laid aside, if one in a hundred escaped with life, it might be looked upon as a miraculous recovery. Let it here be remembered that Sydenham seldom cured a pleurisy with less than the loss of forty ounces of blood, and then consider whether this will be in general taken by the application of leeches to the side. But as the laws of sympathy have never yet been accurately explained, it would have been a satisfaction to the reader if Mr. I. Hunter had first explained the nature of this sympathy, and illustrated his opinion by some evident examples.

The next object should have been to have shewn what would be the effect of the bite of a leech on the skin, and then to have proved that the transfer of this external effect, by the medium of sympathy, would act as an antidote on the internal disease; as every new hypothesis should at least have connected argument to support it.

\* I. Hunter on gun-shot wounds, page 339.



The species of sympathy, which is made the basis of his argument, is certainly the most simple; it is in reality no more than a local affection; and if it is to have this nominal distinction, it is so limited that it can only be considered as a part sympathizing with itself. If we admit that bleeding on an inflamed part will produce the effect that he asserts it does produce, this is no proof that bleeding on the external parts shall by the power of sympathy relieve internal disease.

Blisters are in general made use of with this intention; and in cases of external inflammation are frequently applied to the neighbouring parts beyond the limits of disease; for instance, in cases of erysipelas of the head and face, they are applied to the shoulders with great advantage. But if this be an useful practice when applied to distant parts, we are not to conclude that they might be applied to the part affected with equal safety and advantage; so, by a parity of reasoning, if the application of leeches was evidently proved to be an efficacious remedy when made use of to the part affected, this is no proof that their influence would extend from an external part which was in a state of health to an internal seat of disease.

In one instance we are told that topical bleeding "acts by continued sympathy \*," and immediately afterwards we are informed, "likewise, that contiguous sympathy comes into action," from which it appears, that all kinds of sympathy are equally convenient for his purpose; but the whole argument depends on the philosophy of authority, and reason is not once appealed to.

\* I. Hunter on gun-shot wounds, page 338.

I must acknowledge that we afterwards meet with two very curious examples, one of continuous sympathy, the other of contiguous sympathy; which for the satisfaction of the reader it will be right to notice. In one instance the disease was cured by a local application, in the other the remedy was applied to a distant part. Our ingenious author observes, "we have the cramp in the leg cured by a gentle irritation round the lower part of the thigh, such as a garter, which may be said to arise from derivation or sympathy \*;" this must certainly be acknowledged to be a striking example of the successful application of the remedy to the part affected. The next is an illustration of the doctrine of sympathy still more instructive: he says, "I have known, in a nervous girl, a pain in one arm cured by rubbing the other." The pain was in one arm, the remedy was applied to the other; any person, less conversant with the laws of sympathy, would in all probability have applied the remedy to the part in pain; and consequently if the success depended on the remedy being applied to a distant part, both doctor and patient must certainly have been disappointed. But the girl was nervous, and much might depend on that circumstance; it therefore becomes a question of some importance, and well worthy the attention of the curious, to determine where the rubbing ought to have been applied if the girl had not been nervous. And if the solution of this question is necessary to a full investigation of the laws of sympathy, and topical bleeding is to be explained on the same principles, we must not expect the doctrine of topical bleeding to be established on a permanent basis, until this important question is decided.

Leeches are sometimes made use of in ecchymosis; but although Mr.

\* I. Hunter on gun-shot wounds, page 353.

John Hunter has given some \*singular instances of this disease, he does not recommend this practice. Whether leeches would or would not be useful on such occasions is a question of no great importance to the doctrine of topical bleeding, as the order of the circulation is here violated, and the blood escaped from its natural boundaries; every one, who has attended to this branch of practice, must have seen frequent instances where ecchymosis has been produced by leeches, and perhaps it is more frequently the cause of this disease than the means of cure. I believe it is a remedy that is in high reputation in the higher circles, and as it may prove an innocent amusement where a gentleman has been so unfortunate

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\* "Mrs. B---t fell backwards and pitched upon a pail which was behind her, and the left labium pudendi struck against its handle with the whole weight of her body.

Within five minutes after the accident, the bruised part swelled to as great a degree as the skin would allow; from which sudden appearance of the swelling, and the feeling of fluctuation, I concluded that blood had been extravasated by the rupture of some small artery. I bled her, and desired a poultice to be applied to the part, in order to keep the skin as easy as possible under such distention.

Believing the tumor to arise from extravasated blood, I did not chuse to open it, that the bleeding might be sooner stopped by the pressure of the extravasated blood against the sides of the cavity. Some hours after the accident the skin burst, and a good deal of blood came away. On examining the wound I found the opening of considerable size, leading into a cavity as large as the egg of a goose, and filled with coagulated blood, which I did not remove for the reason given above, that it might assist in stopping the vessels which were still bleeding. The poultice was continued, the bleeding gradually became less; and every time I examined the part, I found the cavity diminished, but still filled with coagulated blood, which continued to be pushed out of the wound, and after some time a slough came off from the bruised skin, which enlarged the size of the wound. About a fortnight after the accident the parts were all so much collapsed, as to have forced out the blood entirely, and there seemed only a superficial sore, not above an inch long and half an inch wide.

This practice should be generally followed in such cases of ecchymosis." I. Hunter on gun-shot wounds, page 196 and 197.



to get a black eye, which in most instances time alone would cure, I shall not attempt either to prevent the patient the satisfaction of being imposed upon, or deprive the surgeon of an apology for his fee. I do not pretend to assert that the application of leeches is never necessary; they are frequently made use of with certain good effects to infants in many instances where it would be impossible to bleed with the lancet.

I am ready to acknowledge that it is frequently a difficult business to bleed young children with a lancet, and that sometimes it is impossible; but I am apprehensive that the fear of disappointment has too often prevented the attempt having been made, where the operation might have been performed with ease and safety; and I am well convinced that I have met with repeated instances in very young children where their lives depended on this operation.

It is sometimes attended with difficulties in more advanced periods of life, but when the necessity becomes so important that the life of the patient depends on the success of the operation, every inferior consideration must then appear unworthy of our attention.

The most dexterous surgeon that ever took a lancet in his hand may be disappointed in the first attempt; but this is not a sufficient apology why the operation should not be performed, as I cannot form an idea of any professional disgrace equal to that of letting a patient die for want of bleeding. That I may not appear singular in this statement of the difficulties of performing this operation, I shall once more beg leave to appeal to the authority of Mr. Bell; at the same time I must acknowledge,  
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that the opinion he has given on this subject appears to me to be a libel on the profession\*. But whether the difficulties are real or imaginary, if leeches are made use of as a substitute for the lancet, it is the general effect of the evacuation on the system that produces the salutary consequences and not their topical application. This method of bleeding is supposed by some to be useful under a variety of circumstances; in cases of hæmorrhoidal varix it is frequently recommended, and I shall not on this occasion presume to doubt that it may sometimes prove a convenient application.

But all these instances are unconnected with the theory of topical bleeding.

I have frequently bled children with leeches till they have fainted, and have continued the evacuation in adults for several hours until the quantity has been very considerable, and produced evident effects on the constitution. It would be impossible to ascertain the loss of blood in such instances, but as the evacuation is slow, it is probable that the patient would bear a greater loss by this method than that by the lancet; but if the quan-

\* "Blood-letting, whether we consider it as to its influence on the system, or with respect to the niceness and even difficulty of the mode usually employed for effecting it, is perhaps one of the most important operations in surgery. From its being so frequently put in practice, and from every pretender to any knowledge in the healing art being able to perform it without any apparent difficulty, the public have been induced to consider it as trivial with respect to its execution; but every practitioner of character must acknowledge, that, in order to perform this operation properly, the greatest nicety, steadiness, and exactness, are necessary. All the other operations in surgery I have frequently seen well performed; but I can with freedom say, that I have seldom seen blood-letting with the lancet done very correctly: When properly performed it is really a neat operation; but when not done with exactness, it is the very reverse." Bell's system of surgery, page 77 and 78.

tity is larger when taken very gradually, the effect is not instantaneous or great in proportion to the quantity.

There is no doubt but the loss of a pound or two of blood will have considerable effect on the constitution, whether it be taken by the lancet or by any other method; what I contend for is, that its effects must be general, and not limited to the part from which it is taken. The effects of this operation will depend principally on the quantity that is taken away, and the expedition with which the blood is evacuated; as the salutary influence of every kind of bleeding, in inflammatory diseases, will be regulated by these circumstances, and, for this purpose, the lancet is the only instrument by which these important objects can be accomplished.

But so long as topical bleeding may serve to decorate a physician's prescription, to amuse the patient, or impose upon his friends, to procure a fee to the surgeon, or add a charge to the apothecary's bill, it is certain to be supported, in opposition to all the arguments that reason or philosophy may advance against it.



## SECTION VIII.

### THE HISTORICAL EVIDENCE OF THE EFFECTS OF THE BARK IN CASES OF MORTIFICATION.



WHEN a theory is formed first, and cases afterwards collected in support of it, we too often find that the facts are adjusted to the particular purpose; and I am well convinced that this species of misrepresentation frequently takes place without design. The practice of physic and surgery is a subject that is at best obscure, and in many instances it will be very difficult for the most candid observer to discriminate with accuracy; but, when a writer has any favourite opinion to support, it will be much more difficult either to judge with impartiality or to describe with truth.

The examples, that will appear in evidence on this occasion, will sufficiently justify the propriety of this assertion, and illustrate the difficulty of distinguishing between the effects of medicine and the uninterrupted progress of the operations of nature. The present question depends alone on written evidence, and the whole argument rests upon the authority of unalterable records, that cannot be made subservient to the accommodation of speculative hypothesis.

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When Mr. Sharp published his critical Enquiry in the year 1750, the bark had then been used as a remedy in mortifications for more than thirty years. He was a man of extensive information and sound judgment, and might justly be considered as presiding at the head of his profession: he had for many years been a teacher of anatomy, and surgeon to Guy's hospital, where he had frequent opportunities of seeing the effects of this new method of practice; and yet, after deliberately examining the subject, he gives it as his decided opinion that the bark was not an efficacious remedy in cases of mortification. This publication of Mr. Sharp's immediately became a subject of general attention, and is mentioned by most succeeding writers; but the above observations have I believe never yet been noticed, and the bark has been made use of for these last fifty years with the same blind enthusiasm, as if his objections had never made their appearance.

About the year seventy-nine\*, Mr. Pott published his observations on the mortification of the toes and feet, and pointedly denies the efficacy of the bark in this species of disease. Now if we examine the cases that have been recorded on this subject, where the bark was supposed to stop the progress of the disease; we shall find that most of the instances were of this kind, in which Mr. Pott asserts that it is not efficacious.

Mr. Sharp observes that mortification frequently stops spontaneously, independent of the influence of medicine; and if, agreeably to Mr. Pott's opinion, the bark has no influence in cases of mortification of the toes and feet, the inference is unquestionable that, in all these cases that were sup-

\* Pott's surgical works, second edition, 1779.

posed to have been cured by the bark, the diseases must have stopped spontaneously. Mr. Pott, having distinguished this particular species of disease, is more limited in this idea than Mr. Sharp, but we may consider the two as concurring opinions in favour of the present arguments.

The mortification of the toes and feet is certainly as much disposed to stop spontaneously, as any other kind of mortification; and it is to this species of disease, that Mr. Sharp alludes in support of his assertion. But as I wish to give a full and clear statement of this argument, and at the same time avoid all suspicion of misrepresentation, I shall here give Mr. Sharp's opinion in his own words.

He says, "The other method of destroying Mortifications, either by the potential Caustery or the Knife, are so deservedly exploded, that I shall not enquire into their Merits: But there has lately started up in *Great Britain* a new Practice of treating this Complaint, which at present makes some noise in the other Parts of *Europe*, and is therefore worth our Attention. Every body will immediately conclude, that I mean the *Cortex Peruvianus*, which within these few years has been so exalted for its Virtues in stopping a gangrene, that the Caustery itself was not more esteemed amongst the Ancients, than is this medicine by some of the Moderns. I know it will be looked upon by many, as a kind of Scepticism, to doubt the Efficacy of a Remedy, so well attested by such an infinity of Cases, and yet I shall frankly own, I have never clearly to my Satisfaction met with any evident Proofs of its Preference to the Cordial Medicines usually prescribed, though I have a long time made Experiment of it with a view to search into the Truth.

"Perhaps



“Perhaps it may seem strange thus to dispute a Doctrine established on what is called Matter of Fact; but I shall here observe, that in the Practice of Physic and Surgery, it is often exceedingly difficult to ascertain a Fact. Prejudice or want of Abilities sometime misleads us in our Judgment where there is evidently a right and a wrong; but in certain Cases to distinguish how far the Remedy and how far Nature operate, is probably above our discernment: In Gangrenes particularly, there is frequently such a Complication of unknown Circumstances as cannot but tend to deceive an unwary observer. Mortifications arising from mere Cold, Compression, or *Stricture*, generally cease upon removing the Cause, and are therefore seldom proper Cases for proving the power of Bark: However there are two kinds of Gangrene, where Internals have a fairer trial; those are a spreading Gangrene from an internal Cause, and a spreading Gangrene from violent external Accidents, such as Gun-shot Wounds, compound Fractures, &c. Yet even here we cannot judge of their Effect with absolute certainty; for sometimes a Mortification from internal Causes is a kind of critical Disorder: There seems to be a certain portion of the Body destined to perish and no more; of this we have an infinity of Examples brought into our Hospitals, where the Gangrene stops at a particular Point, without the least assistance from Art; the same thing happens in the other Species of Gangrene from violent Accidents, where the Injury appears to be communicated to a certain Distance and no farther, though by the way I shall remark in this place, contrary to the received Opinion, that Gangrenes from these Accidents, (where there has been no previous straitness of Bandage), are as often fatal as those from internal causes.

“As I have here stated the Fact; we see how difficult it is to ascertain  
the

the real Efficacy of this Medicine: But had Bark in any degree those wonderful Effects in Gangrenes, which it has in periodical Complaints, its preeminence would no more be doubted in the one Case than in the other. What in my Judgment seems to have raised its Character so high, are the great numbers of single Observations published on this Subject, the Authors of which not having frequent Opportunities of seeing the issue of this disorder, under the use of cordials, &c. and some of them perhaps prejudiced with the common Supposition that every Gangrene is of itself mortal, have therefore ascribed a marvellous influence to the Bark when the event has proved successful\*."

The first case of mortification, in which the bark was tried by Mr. Rushworth of Northampton, was evidently the same species of disease that is mentioned by Mr. Pott; but in the former instance it was attended with an intermittent fever, on which account the bark seems first to have been directed. As this case is the basis of this celebrated practice, as such it certainly deserves attention.

Mr. Rushworth sent a printed letter to the masters and governors of the surgeons company in London, dated October 18, 1731, in which he gives the following account of his using the bark in mortifications.

"In the Year 1715, I was sent for to a Man who had a Mortification on the foot from an internal Cause: The Fever was very high, attended with the irregular Pulse that is usual in the Case. I made deep Incisions in the mortified Part to the bone, and scarrified all round as far as there was any Inflammation, and used the common Applications; upon which the Fe-

\* Sharp's critical enquiry, page 255.



ver abated, the Pulse became not only calm, but also regular, and in a few Days I had a Digestion at the Edges: I was obliged to leave it to the Care of an Apothecary, but in a short Time I was sent for again, the Fever being returned, and the Part mortified higher: I used the same Method as before, with the same Success: but all the former Symptoms returned the third Time; but upon repeating the same Method again, ceased: I thought it to no Purpose to take off the Leg, having too often found Returns after it, the Fault being in the Blood and Juices.

*“But Providence now first directed me to order the Bark in this Case, (whilst there was a Remission of the Fever), it answered beyond what I expected, the Fever no more returned; the Leg was taken off, and I saw the Person well and lusty many Years afterwards; and I have since several Times had the Experience of the good Effects of it in the like Cases, which has been no small Satisfaction to me.”*

This is a curious case, and though limited to less than two small pages, it evidently proves how much these case writers were disposed to impose upon themselves, and afterwards transfer the imposition on the public. I do not accuse them of criminality of intention; it is the head, and not the heart that becomes the object of our disapprobation. But, wherever the cause may have originated, the consequence must ever prove an impediment to the progress of scientific investigation; and if some of the first writers on this subject have unfortunately been imposed upon by the delusive charms of imaginary discovery, I shall leave those readers to defend themselves, who have become participators in this system of imperfection.

First we are told that this was a mortification in the foot from an internal



nal cause, in which Mr. Pott asserts that the bark is not efficacious; nor does it appear from this instance that the bark was productive of any salutary consequences; for Mr. Rushworth observes that the disease was cured by incisions and scarifications. But let us here attend to the manner in which these operations were performed; deep incisions were made in the mortified parts to the bone. If the mortification reached the bone, the incisions would do no harm, but if the incisions exceeded the limits of the mortification they would then be prejudicial. I shall not attempt to determine what distinction should be made on this occasion between incisions and scarifications, but we are then informed that he scarified all round, as far as there was any inflammation: if these scarifications were made on an inflamed part, they would certainly aggravate the disease, if they were on the parts already dead, they were both useless and unnecessary.

But by incisions, scarifications, and the common applications, the fever abated, the pulse became calm and regular, and digestion was procured. Yet the disease in a short time returned, and the same remedies were made use of with similar success. The disease returned a third time, and the same plan of treatment again succeeded. He does not say that the disease returned a fourth time, but he says providence now (I suppose he means after the third cure was accomplished) directed me to order the bark in this case, whilst there was a remission of the fever; and then adds, "that it answered beyond what he expected, the fever no more returned;" from which we find, that the bark was given in this case after the recovery; but, notwithstanding the perfection of this cure, the leg was taken off.

The

The first observation that he makes, after the third cure was accomplished, is to express his disapprobation of amputation; yet after this third cure is supposed to have been confirmed, and the return of disease prevented by this new remedy, which was never given before under similar circumstances, the limb was amputated without any additional cause being assigned, or any reason urged in defence of the operation. Such are the merits of the first case that the history of surgery has recorded on this important subject. The glorious uncertainty of the law has long been an object of general admiration; and I flatter myself that the present illustrious example, and the evidence that I shall afterwards have occasion to examine, will satisfactorily prove that the practice of physic and surgery have equal claim to the same honorary distinctions.

The next year, Mr. Rushworth reprinted the forementioned letter, with a letter to Serjeant Amyand, in which he says, "I beg leave just to mention that leaving off the *Bark* too soon, a Patient of mine had a Return of the Mortification, in about five Days Time, but scarifying and repeating it, I presently had the good Effect of it again, and she is now perfectly recovered; and though she had a very ill Habit of Body before, is now much better than she had been for several Years, though she is Fifty Years of Age."

If we compare this case with the former we shall find that in both instances the disease returned: in the former the disease was three times cured with scarifications without bark, in this scarifying and bark were both made use of, and the patient perfectly recovered.

In

In page 35 of the same pamphlet, he says, "It is necessary that I intimate to all surgeons what I have mentioned to our Company, that I would not be misunderstood by my printed Letter, as if the Bark would answer in Mortifications from all internal Causes; for in some it is not proper, as Surgeons may easily suggest to themselves."

From which it is evident that this new method of treatment was not always attended with success; but that the bark may not be deprived of any of these newly discovered virtues, the want of success is attributed to the nature of the disease, and not to the inefficacy of the remedy. If by mortifications from internal causes he means the mortifications of the toes and feet, this evidence will then coincide with Mr. Pott's opinion on the same subject. It is evident that one motive for mentioning this second edition, was for the purpose of introducing Serjeant Amyand, who was one of the professional heroes of the day; whose letter to Mr. Rushworth is dated July 29, 1732, in which he gives the following account of his success in giving the bark in mortifications.

"I am now to acknowledge yours of the 17th. instant, and to acquaint you, that from your Example I have given the *Bark* in all Mortifications with such Success, as has encouraged the Gentlemen you mentioned to administer it. I have now under my Care a Gentleman of 78, who owes his Life to that Medicine. His Case was at first a *Gangrene* after a *Phlegmon*: the usual means seemed to have removed the Danger, but the Fever continuing without Remission or Intermision, *Sphacelus* soon appeared, which nothing did stop the progress of till the *Bark* was used, and in twenty-four hours, and less, the Separation begun with a laudable Pus,

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The



The same Thing happened to a *Jew* whose *Sphacelus* had got ground for three Weeks, in spite of all means, where several Surgeons were concerned.

“I have now used it in Seven Cases the Circumstances in each being different, and yet in all the *Bark* has taken Effect: Even within these few Days, to Mr. Delenor, who kept the *Bagnio* in *St. James's Street*, in whom a Mortification happened, after several punctures in Dropical Legs, the *Bark* stopped the progress in less than twenty-four Hours, and the Sloughs began to separate: but the patient having a Jaundice, and spent with Evacuations, it revived and came into the other Leg; of which, though he died, yet the Power of the *Bark* was so plain, that from this and the other Cases, I think it evident, that we may be as sure of getting the better of, or at least of stopping a Mortification from an internal Cause by the *Bark*, as conquering an ague thereby.”

The first of these cases is said to be a gangrene, after a phlegmon, which changed to a sphacelus, and was cured by the bark in twenty-four hours; the second is a similar case that continued for three weeks,

If we look back to Mr. Sharp's opinion, we shall find that he particularly mentions spreading gangrenes, as proper examples for determining the point in question; but if this was a spreading gangrene, its progress was very slow, as it lasted for three weeks before the bark was made use of. We are then informed that he had used the bark in seven cases, and that of Mr. Delenor is added; but if we are to judge of the whole evidence by that before us, we shall find it very difficult to form a satisfactory opinion, or draw a rational conclusion.

This

This last case was a mortification of the integuments from distention and debility, and it is very evident from this short description, that the patient had a diseased liver; under which circumstances the bark was inadmissible, and the event which was not in the power of medicine to guard against explained the whole. But Mr. Amyand concluded with expressing his unlimited confidence of the powers of the bark in mortifications from an internal cause, though Mr. Rushworth had just before given a contrary opinion. I shall not attempt to reconcile this difference of opinion, I only wish to observe that the want of coincidence must invalidate their authority.

Mr. Douglas in the same year published two cases of mortification of the toes and feet, in one the bark was given and the patient recovered; in the other the bark was not given and the patient died. This pamphlet contains only forty-eight pages; but if any one will assert that he can read this little book without great entertainment and considerable instruction, I shall presume to observe in reply that such a reader must be void of taste and destitute of penetration. There is certainly an uncommon degree of plainness pervading the whole, but it is adorned with that graceful simplicity, which always decorates the truth. The plan and progress of the consultation, the prejudice of the physician, his contest with the surgeons, the intrusion of a friend, the impertinence of the lawyer, the anxiety of a presumptive heir, &c. &c. present a wide and fertile field of speculation for the moralist, the historian, or philosopher. But if it does not appear in the same pleasing light to others, I shall be happy, when opportunity serves, to write a volume of commentaries on Mr. Douglas's little pamphlet.

As

As this case is in many respects particularly interesting, and as the treatment was conducted by some of the first surgeons of that period, I shall not attempt an abridgment, but give an exact copy of the whole.

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OBSERVATION OF A MORTIFICATION STOPPED BY THE BARK;

by Mr. JOHN DOUGLAS.

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“ April 22, 1732, I was sent for about 15 Miles out of Town, to visit a Gentleman, a little turned of Fifty, where I met *Dr. Newington* of *Greenwich*, and *Mr. Wade*, Surgeon and Apothecary, of *Bromley*. Upon Examination, I found the Back of his Right Foot mortified near the middle Toes, about the breadth of a Shilling, the Small of the same Leg being pretty much tumified, and pitted a little in some Places; his Pulse quick, and his Tongue dry. Upon Enquiry whether he had received any Bruise, Wrench, or Wound, he answered, not as he remembered; but some persons about him talked of a straight Shoe, which he had complained of some time before, which there was no Stress to be laid on: Therefore we were all of opinion that it proceeded from an internal Cause. The Dressings being prepared, I began to scarify on the mortified part, and cut to the Bones without giving him any pain. I then continued the Incisions through the Skin, all over the Back of the Foot, which was a little tumified; without his discovering the least Sense of feeling, which did



did not a little surprise me, the Skin looking perfectly fair: I then went on all over the Fore Part of the Small of his Leg, whence we had a considerable Discharge of a sort of bloody Water, but there was still no Sensation; therefore I proceeded as high as the Gartering below Knee, when he began to complain a little, and pure Blood followed the Knife: His Limb was then well stuped with a strong Fomentation, and the Wounds dressed with Pledgets armed with Digestive, and dipped in hot *Ol. Tereb.* over them was applied a Poultice made of *Oatmeal, Stale Beer, and Ther. Lond.*

“He was then carried to Bed, and the Doctor wrote thus:

*R. Conf. Raleigh. drachmum dimidium.*

*Pulv. e. Chil. C. C.*

*Rad. Serp. v. aa scrupulum dimidium.*

*Conf. Alkerm. q. s.*

*f. Bol. 4ta. quaq. hora sumend.*

*superbibend. Coch. 4. Julap. Sequent.*

*R. Aq. Lact.*

*Cerafor. Nig.*

*Theriacal. aa uncias tres.*

*Syr. Croc. drachmas sex. m. f. Julap.*

*Bibat feri lact. Aq. Ther. Alterat. Copiose.*

“As soon as we withdrew into another Room, the Company asked me what I thought of the Gentleman's Case? I told them, I thought he was in very great danger, not only as it proceeded from an internal Cause, but

because it had spread so far in so little Time. Upon which they replied, We hope you will not take it amiss if we send to *London*, for farther Advice: I answered, No not I, far from it, I desire you would. Upon which being, desired to Name the Person to be sent for, I wrote down several Surgeons Names of the best Note in *London*, viz. *Serjeant Dickins*, *William Cheselden*, *Esq.* *Mr. Fern*, *Mr. Petty*, &c. and told them they might choose any of them they thought fit.

April 23. "This Morning *Serjeant Dickins* and *Mr. Cheselden* came down, and after they had seen and examined the Patient, they told him that every Thing had been done for him which was proper; that the Progress of the Disease appeared to be stopped, and that he had nothing to do but to go on in the same Method.

24. "His Pulse was much the same as before, and the Mortification did not seem to spread.

*Dr. Newington* wrote as follows:

*R. Conf. Raleigh.*

*Lap. Contrayerv. aa scrupulum unum.*

*Syr. Croc. q. s.*

*f. Bol. 5ta. quaq; hora sumend. Superbibend. Coch. iv. Julap. Prescript.*

25. "His Fever was high, his Tongue dry, and the Mortification began to spread a little. I scarified it deep, and dressed warm.

April

April 26. "I could not perceive that the Mortification had made any further Progreſs.

The Doct̃or wrote thus :

R. *Decoct. Commun. Glysterii. uncias octo.*

*Ol. Chamæm.*

*Syr. Violar. aa uncias duas.*

*f. Enema hoc Vespere Injiciend.*

R. *Pulv. e Chel. c. c. scrupulum unum.*

*Croc. Anglican.*

*Confect. Raleigh. aa scrupulum dimidium.*

*Syr. Caryoph. q. s.*

*f. Bol. Sexta quaq; hora ſumend. Superbib. Coch. iv. Julap. Seq.*

R. *Aq. Laët. Alex. Menth. aa uncias quatuor.*

*Theriacal. uncias tres.*

*Syr. Croc. drachmas ſex f. Julap.*

27. "His Fever increaſed, and the Mortification ſpread croſs the Toes, towards the Ball of the Foot which I ſcarified deep, and dreſſed as before.

28. "The Mortification ſtill got Ground, therefore I had Recourſe to the Actual Cautery, with which I burned where-ever it was corrupted.

29. "I found no Benefit from the Actual Cautery, for the Mortification &c. increaſed, ſo that I told thoſe about him, I had no hopes of his Life:  
They



They immediately replied, What! Would not taking off his Limb save him? No, I said, I did not think it would: But advised them to send for the two Gentlemen they had consulted before, and if they thought taking off the Leg would give him any better Chance for his Life, I would do it. So I was desired to bring them next Day.

April 30. "This Morning, *Dr. Newington, Serjeant Dickins, Mr. Chefelden, Mr. Wade*, and myself, met in his Chamber, and found his Fever very high, his Tongue *dry, enough to grate a nutmeg*, his Visage wild, a great Drought upon him, very restless, the Mortification spread as far as the *Tend. Achill.* and he complained also of a Hardness and Pain in one Side of his Belly. After withdrawing, we were all of opinion, that taking off his Limb would be of no Use, and that in all Probability he could not live 24 hours longer.

"Upon this Serjeant *Dickins* said, Gentlemen, you see we can do nothing in this deplorable Case, with warm Applications, Incisions, or Fire; *Mr. Douglass* has already used them sufficiently, and the Doctor has directed the internal Medicines usually prescribed by Physicians in these Cases; nevertheless, the Disease, instead of abating, gets Ground: I would therefore recommend the Trial of the *Bark*, which has had surprising Effects in Mortifications, as I am informed by Serjeant *Amyand*, a Gentleman, you all know, of the greatest Integrity and Honour, who has experienced it several Times in very desperate Cases: It has also been successfully given for the same Purpose by *Mr. Rushworth*, a Surgeon in *Northampton*; but I can say nothing to it from my own Knowledge or Experience; however, I think, in our present Case, bad as it is, if it does

no

no Good, it can do no Harm; Mr. *Chefelden* was of *Opinion* that it would do no Harm, but added, that he had never heard of its being serviceable in such Complaints; nor did he believe that This, or any Other Medicine, would succeed in the present Case: Nay, says he, if the *Bark* has ever done good in *Mortifications*, it is not giving it fair Play, to expect any thing from it in such a one as *This*.

“I told Serjeant *Dickins*, I had never heard that the *Bark* was administered in *Mortifications* before; but, since he had so good Authority for it, which, in my opinion, was much the same as his own Experience, and since it was the Extreme Remedy, I was for having it given as soon as possible.

“Dr. *Newington* said, we might give him what we pleased; but, in his Opinion, he would not live till the next Day.

“However, Mr. *Wade* being also desirous of making Trial of the *Bark*, did a little Time afterwards desire the Doctor to write down a form for that Purpose; which the Doctor refused, alledging it to be a Practice so much out of the way, that he would not have it seen under his Hand. *Which is not at all strange, considering it was a medicine cooked up by a Parcel of Surgeons who had no Authority except experience to alter the established Practice.* However, it was given that same Evening, in the following manner.

R. Cort. Peruvian. opt. Subtilifs. pulv. drachmam dimidiam.

Conf. Alkerm. q. s.

f. Bol. 4ta. quaq; hor. sumend.

W w

“ When



“When I went Home, I desired the Servants, if he died in the Night, to acquaint me with it early next morning.

May 1. “I returned about Noon, but instead of finding him dead, as I expected, they told me at the Door, he had had a fine Night: I went immediately up to his Chamber, and found a surprising Alteration for the better. His pulse was calm, his Tongue moister, the Wildness of his Countenance gone, and he said he had rested much better than any other Night from the beginning of his Disorder. When I opened his Leg I found the Mortification had made no further Progress. He had then taken but four or five doses of the *Bark*. The Doctor supposing him to be dead did not come.

2. “He was still better, and we had a small Discharge from the fore. He had had five or six small Stools. Therefore Mr. *Wade* and I agreed to add three Drops of *Laud. Liq.* to each Bolus of the *Bark*, which soon answered the End.

3. I found two large *Abcesses* formed, one on each Ankle. The innermost being biggest, I opened it first, and had about four or five Ounces of good Pus: Then I opened the other, and found near the same Quantity of Matter. I could now thrust my fore Finger with Ease, through from the Internal to the External Wound, between the *Tend. Achill.* and the Bones of the *Tarsus*, notwithstanding the outermost Tumour subsided but very little after opening the innermost.

“Thus the Violence of the Fever being taken off by the *Bark*, Nature  
was



was enabled to form these *Abſceſſes*, which was an infallible Sign that the Progreſs of the Mortification was ſtopped. We then ordered the *Bark* ſhould be given only every fix Hours.

May 4. “This Morning Serjeant *Dickins* and Mr. *Cheſelden* called at my Houſe, and I acquainted them with the extraordinary Change in our Patient, ſince he had taken the *Bark*: They were both agreeably ſurpriſed, and pleaſed to hear of that wonderful and ſpeedy Alteration for the better: Nay, Mr. *Cheſelden* could not but own, that the *Bark* had reſcued him from the Jaws of Death. Soon after I parted from them, I ſet out to viſit my Patient: When I got thither, I found his Pulſe higher, his Tongue a little Dry, and the Diſcharge rather leſs than the day before: Therefore we ordered the *Bark* to be given again every four hours, and a Glaſs of dry *Madera* Wine after it.

5. “I found his Pulſe regular, the Diſteſtion Plentiful and laudable, his Countenance ſerene &c.

6. “I found him very uneaſy, and his Pulſe quicker than the Day before; therefore enquired whether he had taken the *Bark*, as directed: Yes, yes, ſaid they, he has not miſſed taking it once; that is not the Cauſe of his Diſorder, he has been talked to too much, and upon a very improper Subject. Upon Enquiry by whom, and about what, I found that a *Limb of the Law* had thruſt himſelf into his Room, whether his Attendants would or no, and when there, had Modeſty enough to tell him, notwithstanding the weak Condition he was in, That he had brought a Gentleman to his Houſe, who, in his Opinion, had the beſt Title to his Eſtate,  
&c.

&c. Pretty Discourse indeed! People that are in perfect Health, do not care to hear of Heirs, especially strange ones, much less when dangerously ill. I then gave strict Charge to those about him, that nobody should be admitted to talk to him about any thing but his Health.

May 7. "I found his Pulse in good Order; the Digestion plentiful &c.

8. "His four little Toes being entirely mortified, I cut them off.

9. "I cut off his great Toe, and desired him to eat, and drink more freely, and continue the *Bark* as before.

11. "Dr. *Newington*, who had not been to visit him since the 30th. of *April*, called, and was very well pleased to find such an Alteration in our Patient, and desired us to go on in the same Way.

14. "Mr. *Chefelden* came to my House, and acquainted me, that he was a going to visit my Patient. I asked him who gave him such Instructions without my Knowledge or Desire? He replied, One of the Heirs to my Patient's Estate (who, I suppose, was afraid he was not taken sufficient Care of) had desired him to go. I assured him that there was at present no need of a Consultation, otherwise I should have sent to Serjeant *Dickins*, and him too: Therefore I hoped, he that sent him would pay him; and if so, he might send half a Score every Day, if he thought fit. So we went together. When the Patient's Leg was undressed, and Mr. *Chefelden* saw a plentiful and laudable Discharge, from all the Wounds  
which

which had been made, a total Separation between the living and the dead Parts, and the Sloughs hanging like Tatters of Rags all about ; he could not help shewing his Surprise at a Sight he had so little Expectation of when there last, *viz.* on the 30th. of April. He then told the Gentleman, his Leg was in as good a Way as possible, and there was no more to be done, but to go on.

May 18. "He had two large Stools in the Morning, and a great Discharge from his Wounds, which I thought weakened him a little, therefore we ordered a Mixture with *Conf. Fracastor*, to be taken, in Case he had any more Stools, and also to add *Laud. Liq.* to his Bolus's of the *Bark*.

20. "I laid open a large *Sinus* above the inner Ankle.

21. "The Doctor called again to see him, and was very glad to find he went on so well.

24. "Mr. *Wade* and I agreed to give him the *Bark* every six Hours only.

28. "They shewed me an *Oedematous Tumour* on the Back of his other Foot; upon which we ordered him to take no more *Bark*, and drink a little more freely of Wine. He had now taken the *Bark* every four Hours for twenty-three Days, and every six hours for five Days, *i. e.* about Ten Ounces of the *Bark*.

29. "I ordered his Left Foot to be washed well with hot Water, Bran,  
X x and



and Soap, every Morning, to get off the Dirt and scaly foulness, which obstructed Perspiration &c. We also ordered him some Bitter Draughts to be taken three times a day.

May 30. "I found the *Oedematous* Swelling of the Left Foot lessened, and I designed to have purged him, but that he had had two or three natural Stools.

31. "I found him hearty and the Wound in good Order, therefore took off the Bone of the Metatarsus which sustains the little toe.

"An old Gentleman made our Patient a Visit, and was weak enough to tell him, "That he heard his Surgeons had been making Experiments upon him, which might as well have killed him as cured him; and that they were daily *cutting and flashing* his Leg, under Pretence of saving it; but he was satisfied, from what he had heard from others of the same Profession, that it was only prolonging the Time; for nothing would do, but taking the Leg off; it is as good, Sir, (said he) to tell you of it at first, as at last." What do you mean? says our Patient, Mr. *Douglas* says I am out of all Danger now. "He may tell you so, Sir, (replied the old Gentleman) but I know better: If he cures you without taking off your Leg, I should be as forward as any Man to own he had done something extraordinary; but I know how Things will turn out as well as any of them" &c. Our Patient then began to be very uneasy, therefore he was desired to change the Discourse &c.

June 3. "I found an Imposthumation about the fore and middle Part of his Leg, but durst not mention opening it, I found he was so frightened

ed at what had been said to him the Day before, about *cutting and flashing*; therefore I took an occasion to acquaint those about him, that I would bring Serjeant *Dickins* next Day, to satisfy him that it was absolutely necessary to lay it open.

June 4. "Serjeant *Dickins* made him a Visit, and was very well pleased to see him in so good a Way, considering how he was when he saw him last, and agreed with me, that it ought to be opened immediately: Accordingly, tho' with more Difficulty than ever before, he submitted to it, and I made an Incision about two Inches long, and had a Discharge of three or four Ounces of Matter.

5. "I carried him some Spaw Water to drink with his Wine, by the Advice of Serjeant *Dickins*: I also enlarged the Incision I had made the Day before, with my Scissars, before he was aware of it.

6. "All promised well, and the Waters agreed with him.

7. "I cut off another of the *Metatarsal* Bones.

9. "I cut into the Joint of one of the *Metatarsal* Bones, to hasten its Separation.

15. "I cut into the Sloughs in the hollow of his Foot and let out a great deal of Glairy Matter, and then snipped off all the loose Rags of Sloughs, upon which I discovered a large Fungus, which had thrust forth under the Sloughs, from the *Tarsal* Bones.

June

June 16. "I cut off the Remainder of the *Metatarsal* Bones, and sprinkled the Fungus with *Precip. Rub.*

19. "I perceived the *Tibia* bare about the Middle, a large *Sinus*, and a considerable Discharge; therefore advised them to have a Consultation with Serjeant *Dickins* and Mr. *Chefelden*.

21. "Serjeant *Dickins* and Mr. *Chefelden* went along with me, and I laid open that large *Sinus*, and dressed as before.

22. "I laid open a small *Sinus* on the back of his Foot: There was a large Discharge from his Wounds, which weakened him and lessened his Appetite.

23. "The Discharge was very fœtid, and in too large a Quantity.

24. "The Discharge seemed rather to increase, and his Strength to decrease; nevertheless, I laid open two more *Sinus's*.

25. "The Discharge rather increased; however, I laid open one more *Sinus*, and then told them, I was weary of opening daily one *Sinus* after another, without gaining my Point, viz. lessening the Discharge; and that I suspected the *Tibia* was Carious farther than we perceived it, which might be the Cause of that great and constant Discharge, and that, in my Opinion, he could not bear so large a Drain long, and that it was better to have his Limb off before it was too late; Therefore desired another Consultation with the two Gentlemen before-mentioned.

"N. B.



"N. B. The Ulcer reached then, from the Origin of the *Soleus*, *i. e.* just below the Knee, all along the inside of the *Tibia*, as far as the Heel; and in some Places it was very broad, and in others very deep; all the Bones of the Toes and *Metatarfus* were gone, and all those of the *Tarfus* Carious.

June 27. "I could not visit him the 26th, but on the 27th I took Serjeant *Dickins* and Mr. *Chefelden* along with me, and Dr. *Newington* met us there. We were very well pleased to hear from Mr. *Wade*, as soon as we came in, that the Discharge was very much lessened the Day before, occasioned, no Doubt, by the *Sinus's* being all opened: And when his Leg was undressed, we found the Discharge considerably lessened, and could discover no more *Sinus's*; therefore, instead of taking his Leg off, we agreed to proceed as before, only to dress twice a Day, for some Time. The Doctor ordered nothing, but desired us to go on with the Bitter Draughts &c. he was then taking.

28. "I found the Ulcer in good Order, and the Discharge lessened.

July 1. "We ordered him an Infusion of the *Bark* to be taken twice or thrice a Day.

8. "He was carried out into his Garden, for the first Time, in his Three-wheeled Coach, for the Benefit of the Air.

12. "I took off the *Os Cuboides*, and the three small Bones of the *Tarfus*.

July 16. "I separated the *Os Naviculare*, and left only the *Astragalus* and *Os Calcis*.

August 5. "I cut off with a Knife, that large *Fungus* which sprung from the *Os Calcis*, and had plagued him so long, and then applied the Actual Cautey to stop the Blood, and consume the Roots of the *Fungus*. N. B. I had before this tried *Præcip. Rub. Vitriol. Rom. Butyr. Antimon.* nay, the *Potential Cautey*, several Times, one after the other, but could not destroy it.

29. "Part of the *Os Calcis* came away.

September 4. "I took away the *Astragalus* whole, and the Remainder of the *Os Calcis*, as I thought. When these two Bones came out, they left a Hollow big enough to receive a *Duck's Egg*; the back Part was formed by a horny sort of an Excrecence which seemed to spring from the *Tend. Achill*, the fore Part of it by the Remainder of the Flesh which made the back of the Foot, and the upper Part by the Hollow end of the *Tibia*. There was a pretty deal of Blood followed these Bones, therefore I crammed this Hollow full of Lint, and rolled it up tight.

6. "I cut off this large horny Excrecence (which made a half Moon round the End of the *Tibia* with a Knife; there was no Appearance of any Bone in it, yet my Knife stopped when about half way through, which surprised me a little, because I concluded the *Os Calcis* was entirely gone, yet there was a pretty large Piece of it in the middle of the *Fungus*; I therefore cut a little higher towards the *Tend. Achill*. and it separated with ease

case all round. It bled very fresh, so I tied one Vessel which spurted out, and stopped the rest with the Actual Caustery, which at the same time consumed the Roots of the Excrescence. It was very remarkable, that the End of the *Tibia* was not Carious, notwithstanding these foul Bones had remained there so long.

September 13. "I found all the Sloughs separated, the End of the *Tibia* covered with a fine grainy Flesh, the Lips thin, and the Discharge moderate and laudable.

November 8. "Our Patient lay at my House, and Serjeant *Dickins* called next Day to see him, and found that long Ulcer, which reached from his Knee to the Heel, (mentioned page 181) perfectly cicatrized; and though all the Bones of his Foot were taken away, yet the Ulcer on the End of the *Tibia* was not above the Breadth of a Shilling, and otherwise as well conditioned as could be wished; and that he was healthy and hale in every other respect."

This curious history furnishes us with a very accurate description of the practice of surgery of that period; the actual caustery was then sanctioned by the first authority, and the bark at that time not generally known as a remedy in this disease; as the grand object of this case was to prove its efficacy. The commencement of this disease is dated 22 of April 1732, the bark was first given on the thirtieth, and continued till the twenty-eighth of May; but abscesses continued to form, the bones of the tarsus and metatarsus to separate, and the ulcer was not completely healed on the eighth of November following.

If



If we look back to the date when the bark was first given, we shall find that the consultation had limited the life of the patient to 24 hours; and perhaps for the purpose of convincing posterity, how well he was satisfied with the propriety of this decision, (for all authors expect their works to prove immortal) Mr. Douglas desired the servants, if his patient died in the night, to acquaint him early in the morning. But contrary to all expectation the patient had a good night, and there was a surprising alteration for the better by the next day.

Here we must recollect, that the consultation met in the morning, but the bark was not given till evening; and as four doses were taken before the next day at noon, we will suppose that it was taken at 8 and 12 in the evening, and at 4 and 8 in the morning. Now as he is said to have had a fine night, the two first doses of the bark must either have produced this effect, or the crisis must have been spontaneous, depending alone on the salutary powers of nature, *vis medicatrix naturæ*. But under the idea that the medicines were instrumental, why might not the *Confectio. Alkermes* be supposed to contribute some little on this occasion; whatever may be the powers of this medicine, I cannot speak from experience, having never yet had the gratification of seeing the composition, or the satisfaction of giving a single grain. But if we may depend upon the authority of others, it would be the height of scepticism to let this part of the prescription pass unnoticed.

Let us here recollect, that the patient was supposed to be within 24 hours of his dissolution, and if the symptoms were palpitation of the heart, fear,  
terror,

terror, and melancholy, \* that this is the very medicine that has been recommended on such occasions; and the next day, in addition to this cordial medicine, three drops of laudanum were added to every dose of the bark and confectio alkermes, which is the specific on which Mr. Pott places unlimited confidence in similar cases.

But on the third of May Mr. Douglas could thrust his fore finger with ease, through from the external to the internal wound, between the tend. achill. and the bones of the tarsus. On the eighth his four little toes were cut off; on the ninth his great toe was cut off; on the twenty-eighth, the day that the bark was laid aside, he had an oedemateous tumour on the back of his foot; from which it is evident that the disease had then not terminated, and the subsequent history evidently demonstrates the uninterrupted progress and spontaneous termination.

But there is one circumstance more which merits our attention in this case, that Mr. Cheselden was one of the consultation; and as † Mr. Sharp

\* "This is an agreeable Cordial, and proper to raise the Spirits of pregnant Women who are languid and weak, and to give them Strength and Vigour at the Time of Child-birth. It is likewise good in Faintings, Palpitation of the Heart, Fear, Terror, and Melancholy." Brookes's Dispensatory, page 312. Confectio. Alkermes.

† To WILLIAM CHESELDEN, Esq.

Surgeon to Chelsea-Hospital.

SIR,

"As I am chiefly indebted to the Advantage of an Education under You, for whatever Knowledge I can pretend to in Surgery, I could not in the least hesitate to whom I should dedicate this Treatise, though was it my Misfortune to be a Stranger to your Person, that Merit which has made the World so long esteem You the Ornament of our Profession, would alone have induced me to shew You this Mark of my Respect, which I hope will not be unacceptable." Dedication of Sharp's operations of surgery, third edition, 1740.

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was pupil to Mr. Cheselden, it will be reasonable to suppose that this publication had escaped his notice, when speaking of the bark he said, "What in my judgment seems to have raised its Character so high, are the great numbers of single Observations published on this Subject, the Authors of which not having frequent Opportunities of seeing the issue of this Disorder, under the use of Cordials &c. and some of them perhaps prejudiced with the common Supposition, that every Gangrene is of itself mortal, have therefore ascribed a marvellous Influence to the Bark when the Event has proved succesful\*."

It is not the propriety of this observation that I object to, I only wish to make it evident, that Mr. Sharp was either unacquainted with the history of his profession, for the last twenty years previous to the publication of his Critical Enquiry, or that he was forgetful of the high authority that he presumed to call in question; as it would be illiberal to suppose that the splendour of Mr. Cheselden's abilities had escaped his attention; or that he meant to question the accuracy of his observation, or the extent of his practice.

Not that I think Mr. Cheselden's † own account of this subject much  
more

\* Sharp's Critical Enquiry, page 257.

† "The use of the Peruvian bark, internally given in cases of surgery, has not been long known; about thirty years since it was highly recommended as a remedy against mortifications, without distinction, and upon no better foundation (as far as I can learn) than its having succeeded in one single case: it was then tried in mortifications from old age and worn-out constitutions, without success, (which cannot be wondered at) and thus it fell into discredit. I have lately seen two cases in which it has done wonders, the one a very large fœtid ulcer in the leg; the other in an arm cut off above the elbow



more satisfactory, for in the year 1749 when he gave his opinion respecting the use of the bark in mortifications, this consultation seems to have escaped his recollection; and, as this was only one year previous to the publication of Mr. Sharp's Critical Enquiry, it certainly should have been noticed by his pupil. But on the authority of both Cheselden and Sharp, it appears evident that the bark was at that time losing its reputation, and the subsequent evidence on this subject has already been investigated. These observations furnish us with an additional example of the inaccuracy of general opinions; and shew too clearly how little we should depend on the authority of great names, and how necessary it is for every one to examine evidence, and form a judgment for himself.

The next instance that I shall notice, is a case of mortification of the toes and feet by Mr. Gooch; where the bark was given and the patient recovered. What is particularly remarkable on this occasion, is, that this case is dated August 24, 1731, which is previous to the above publications, and yet the bark is mentioned as a remedy commonly used in this disease. I do not pretend to assert that this case has any particular claim to our attention, except it is for the purpose of shewing on what humble evidence, the efficacy of the bark in such cases was at first established; and when we

now, where the ulcerated stump had never been healed, was extremely painful, and a sinus was formed from the stump under the *membrana adiposa* up to the head of the *os humeri*. The ulcers in both these cases were extremely foul, the matter fetid, thin, and corrosive; but upon taking the bark, the matter soon grew perfectly good, the pain ceased, the fores grew clean in a few days, and both the patients were soon after cured. These two cases were under the direction of Mr. Ranby, serjeant surgeon to his Majesty, to whom we chiefly owe the present knowledge of its great uses in surgery, and who intends to oblige the public with a treatise on that subject." *Le Dran's Surgery, with remarks &c.* By William Cheselden, Esq. page 468.

review

review the whole, we shall cease to wonder that Mr. Sharp should give his decided negative to the general opinion.

The example before us, as described by Mr. Gooch, is a mortification in a man aged eighty-one, where (it is asserted) the *Bark* seemed to be of great service. He says,

“August the 24th. 1731. I was called to J. H. of M. and found a deep mortification about the breadth of a crown-piece upon the side of his foot. Considering his age, his having been confined to his bed many years, and that he was a drinker of spirituous liquors to excess, there could be but little expectation of curing him; yet it was necessary to prevent his becoming noisome to himself, and every body about him whilst he lived, which I confess I thought would be but a short time, as I told the parish officers who sent for me.

“I directed a ~~gummos~~ and ~~spirituous~~ application and a warm *cataplasme* to the foot twice a day; that he should take a dose of an electuary of the *Bark* and *Snake root* every three hours, washing it down with a glass of anniseed water, which had long been his favorite liquor; and that his diet should be of good nutriment warm and spicy. After regularly persevering in this method about a month, there was a separation of the dead parts from the living, at the junction of the *ossa Cuneiform.* and *metatars.* where I disjoined the foot, without any pain or loss of blood, and the stump was perfectly healed in three months. After this the poor creature lived more than a year, with as good health as for many years before, drinking gin or anniseed water to the day of his death, saying he could not live without it, and that my indulging him with it, he was sure, saved his life.

“In

“In some instances of mortifications, I have seen singular good effects from giving the *Bark* in much larger quantities than commonly prescribed \*.”

Mr. Shipton, after recapitulating what had been said on this subject by preceding writers, describes two cases; one a mortification of the toes and feet, where the bark did not succeed; the other a mortification in consequence of a gun-shot wound, in which the bark was supposed to be efficacious. I shall copy these two cases, because they have been considered of importance by others, not because they have appeared so to me, except it is for the purpose of giving a more perfect representation of this subject.

“Mr. *Shipton* was called to Visit a Gentleman of 50 Years of Age, who, from a too liberal Use of Wine, and a Cachexia arising from thence, had an Inflammation in his Foot, that turned into a Mortification of the Toes and Metatarsus: Tho’ Alexipharmics, and other proper Remedies, both internal and external, had for several Days been used; yet the Mortification spread every day deeper and wider with a Fever, rather slow than any ways violent, and a spurious Diabetes, or a plentiful Discharge of a more limpid Urine. For removing all which; especially since the increased Quantity of Urine seems to require the astringent Qualities of the Bark; and since both *Mr. Rushworth’s* and *Mr. Amyand’s* Trials promised Success, Mr. *Shipton* proposed it to the Physicians and Surgeons, to which they easily agreed, since they were satisfied from several fruitless Trials, that amputation would be of no Service: But tho’ two Scruples of the

\* Gooch on surgery, vol. 2, page 371.



Bark were given every four Hours for some Days together, yet it seem'd ineffectual in removing either the Diabetes or Mortification; the former exhausting the vital Moisture, and the latter, by its spreading still farther, consuming the Flesh, the Patient died in about two Weeks Time.

“The Bark proved more successful in a Patient about 35 Years of Age, of a melancholic scorbutic Habit: For, drawing a Charge of Powder out of a Fowling-Piece, and unwarily clapping the Palm of his right Hand on the Muzzle, the Piece happened to go off; he received a Wound through the middle of his Palm, extending wide and deep, between the thumb and Fore-Finger, whereby the Vessels and Tendons were lacerated: The Hæmorrhage being immediately stopped, his Hand was dressed: For some Days the Patient had a grievous Pain, with a large Swelling and Inflammation in all his Fingers except the Thumb, and all over his Hand and Arm; and nothing came out of the Wound but a large Quantity of Ichor, at first of a bloody, and afterwards of a duskyish Colour, and somewhat fœtid, and the Wound itself of a blackish Colour, spread farther every Day, and the Swelling, Inflammation, and Pain were scarce diminished, tho' recourse was had to the usual Remedies in such Cases.

“But on the Eleventh Day there flowed spontaneously, at four several Times, in the Space of 24 Hours, some Ounces of Blood, which likewise twice stopped spontaneously, and was twice stanch'd by applying *Sp. Terebinth.* and compressing the Hand: And now the Lips of the Wound plainly appeared mortified, and the actual Cautery seem'd to be the last Resort, both for stopping the Hæmorrhage, and the Progress of the Mortification, since the one baffled Fomentations and Cataplasm and the  
other

other Bandages: But if the Cautey should not succeed, Recourse must be had to Amputation; which, how doubtful a Remedy in Bodies of such a Habit, is sufficiently evident, from experience. And in order to put a Stop to both, he likewise thought proper to try the Bark, of whose Efficacy he had then heard a great deal: On the twelfth Day therefore, two Scruples of the Bark were given in the Morning, and repeated every four Hours: Next Morning after the Patient had taken half an Ounce of it, Mr. *Shipton* found the Pain very much abated, the Swelling of the Hand fallen, and a little Pus observed about the Lips of the Wound within the Bandage, and the Edges which the Day before were black with the Mortification, now seemed to begin to separate. The Fever likewise, which at first was no Ways violent, yet pretty sensible, when the Hæmorrhage encreased, now entirely ceased, the Urine depositing a little Sediment of a dirty or whitish yellow, rather than of a lateritious or Rose Colour.

“The Use of the Bark was continued in the same manner for two Days, and afterwards for two Days more, it was taken thrice a Day, and for three Days more only twice a Day, so that there were two Ounces given of it in one Week. In the mean Time the Swelling and Inflammation vanished, a pure Pus flowed from the Wound, the Flesh grew up underneath, and the Pain, which yet continued pretty sharp in the *Carpus*, when the Patient moved it, was much abated.

“For three Weeks after he was very well, only that he had Rheumatic Pains (with which he was usually troubled in Winter) sometimes in his Foot, and sometimes in the *Acromion*, and one or both Scapula's, accompanied with a Swelling; he was free of a Fever, and had an Appetite  
for



for proper Food. But afterwards on the 19th. of *December*, his Appetite became weaker, the Pain in the *Metacarpus* together with the Swelling increased, which seeming to heighten the Day following, the Pulse somewhat quicker on the third Day, and the Swelling of the *Metacarpus*, together with an Inflammation threatened an Abscess, while there flowed a white *Pus* from the Wound, and in the same Quantity as before.

“ But on the fourth Day the Lips of the Wound swelled with Vesicles tended to a Gangrene, with a plentiful Discharge of *Sanies* without any *Pus*, and the Hand and *Carpus* were inflamed, and in much Pain: Upon giving therefore, the Bark in the same manner as before, within the Space of eight Hours, the Patient having scarce taken three Doses, the Pain, which before was very sharp, was laid as by a Charm, and the next Dressing the Swelling of the Hand seemed to abate by one half, and a laudable *Pus* to run from it. At first the Urine was of a pretty intense Colour, and then it gradually became more dilute, with little or no Sediment.

“ After this to prevent a Relapse, he gave half an Ounce of the Bark every Week for six Weeks, having given two Scruples twice every Day for three Days; and at length after four Months he completed this laborious Cure, in which all the Tendons of the *Musculi Perforati* and *Perforantes*, excepting those of the little Finger were imposthumated, and a bone of the *Metacarpus*, and another of the *Carpus*, was laid bare, and he cured one or two Abscesses on the Back of the Hand.

“ From these Histories, and especially from the last, Mr. *Shipton* thinks it pretty evident, that here nothing is to be ascribed either to the joint Vir-  
tues



tues of other Medicines, to the peculiar Disposition of the Humours, to some unknown *Diosyncrasia*, to the spontaneous remitting of the Symptoms, to a fortuitous Crisis and salutary Evacuation by other Secretions; or in fine to Chance, but that the whole Success is solely to be ascribed to the Virtues of the Bark.

“But tho’ in the above-mentioned Histories, the Powder of the Bark is only said to be used; yet should any one on Account of a weak Stomach, or for any other Reason decline it in that Form, Mr. *Shipton* thinks that half that Quantity of the Resin or Extract of it would have the same Effect, since we daily see that Preparations of the Bark have the same Efficacy in intermitting Fevers, where its chief Virtue appears, as the Bark itself.

“But should any one from the first History related by Mr. *Rushworth*, (where he was afraid of administering the Bark while the Fever was continual, and deferred the Use of it till it remitted) contend that there was a latent intermitting Fever in all the Cases mentioned, and consequently, that it was not surprising if the Bark should get the better of it: To this it may be answered, that nothing of this Kind was observed in most, nay quite the contrary in some of the Patients, as pretty good Judges of such Symptoms do testify: But in the last History, where Mr. *Shipton* himself was as attentive as possible to every Circumstance, he cannot say that he observed any thing of a latent or unusual Fever of the continent Kind, much less of the intermitting, nor any febrile Sediment in the Urine, nor unusual Heat, Thirst, or Rigour at a particular Time of the Day, nor any Driness or Blackness of the Tongue; and if we impartially consider

the Matter, we shall find that the Fever, whatever it was, was only symptomatical, which according to the Opinion of the Ancients (nor even do the Moderns deny it, and the Thing is evident of itself) could by no means be an intermitting Fever.

“And to shew what principally regards this Argument, namely, that the Virtue of the Bark in checking a Mortification, is not from its removing any intermitting or latent Fever; Mr. *Shipton* mentions a Treatise of Mr. *Bradley's*, a Surgeon in *London*, in which he says, that the Use of the Bark had the same happy effect in a cachectic and leuco-phlegmatic Woman, who by accident receiving a large and transverse Wound on the upper Part of the Leg, had on the third Day a violent Fever, with a quick and intermitting Pulse, a Driness and Blackness of the Tongue, a stern Countenance, and some Degree of a Delirium, and a Gangrene possessing almost all the leg; by administering the Bark every four hours, the Gangrene was checked in twenty-four Hours Time, and the other Symptoms vanished: But on the fifth Day intermitting the Use of the Bark, she had a Relapse, and upon her resuming it, all the symptoms abated, and the Patient recovered.

“From this History, as also from those mentioned above, it appears that not only the Bark may be administered with Safety, and sometimes with Success, while the Fever continues, but likewise that this Kind of symptomatical Fever is not of the Genus of the common putrid Fevers, which is therefore by some medical Writers, referred to its own peculiar Genus; nor of those that are classed amongst intermitting Fevers, since in all these Physicians observe, that the Use of the Bark is generally noxious, and sometimes fatal; but several Trials evince, that it was salutary in this;  
but

but these Things want to be still farther considered by Physicians. Besides, from the above-mentioned Histories it is worth observing, that tho' in some of them the Wounds were the immediate Cause of a Gangrene, yet that in all of them, the chief and principal Cause seems to be taken from the State and Condition of the Humours, and consequently, that internal Remedies rather than the usual external ones, answered the Purpose with greater Dispatch and Safety\*."

If we view these two cases merely as simple facts, without examining the particulars; the first in which the bark was given without success, proves that in this instance the powers of the remedy were inadequate to the influence of the disease. If then in the second instance the patient recovered, as the bark was given in both, it would be reasonable to conclude, that the success depended on other causes: but as the first case is that kind of disease, in which Mr. Pott asserts that the bark is not efficacious; this case might be considered as evidence in favour of his opinion. The second case is more to the purpose, and if we may depend on the accuracy of the description, it must be admitted as evidence against the opinion given by Mr. Sharp in his critical enquiry. But the want of consistency in most of these instances give us reason to suspect, that each respective statement is adjusted for some particular purpose.

In the preceding case by Mr. Douglas, after the progress of the disease was supposed to have been prevented by the bark, the remedy was omitted, and the disease returned; but if we attend to the histories before us, we shall meet with a description of similar circumstances, whatever were

\* Philosophical Transactions, vol. 37, for the years 1731, 1782, page 434. Abridgement by Doctor Mihles, vol. 2, page 271.



the remedies that were made use of. The first instance of success is described with accuracy, but the second, in which the progress of the disease was supposed to be stopped by three doses of the bark, appears less satisfactory; and if we attend to his subsequent reasoning, we shall meet with some diversity of opinion.

Mr. Shipton in one place thinks it is pretty evident, that nothing is to be ascribed to a *peculiar disposition of the humours*, to some unknown *diosyncrasia*, to spontaneous remitting of the symptoms, or a fortuitous crisis; and yet he afterwards observes, that from the above-mentioned histories it is worth observing, that though in some of them the wounds were the immediate cause of a gangrene, yet in all of them, the chief and principal cause seems to be taken from the state and condition of the humours; "and consequently, that internal remedies rather than the usual external ones, answer the purpose with greater dispatch and safety." This method of case writing may serve the purpose of empiricism; and may impose upon the credulous, or amuse the gaping multitude; but will neither satisfy the philosopher, nor clear the cause of truth.

I have thus endeavoured to examine the basis, on which this important subject was first established; and if we review the evidence, we must certainly acknowledge the fallacy of this species of reasoning on medical subjects. In the first place Rushworth, Amyand, Douglas, Shipton, and many others have endeavoured to prove that the bark is a certain remedy in all cases of mortification. About twenty years afterwards, Mr. Sharp asserts, that these historians were all deceived: and having met with frequent instances where mortification stops spontaneously, he gives it as  
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his opinion, that these successful cases depended alone on the powers of nature, and not on the salutary influence of the bark.

But these observations have for fifty years remained unnoticed; whether this circumstance is to be attributed to the insignificance of Mr. Sharp's opinion, or the inattention of his readers, remains to be determined.

Here the subject rested for near thirty years, and the bark was given with unlimited confidence on all occasions; when Mr. Pott discovered that the mortification of the toes and feet was a distinct species of disease, and at the same time gave it as his decided opinion that in this instance the bark was not an efficacious remedy.

Now as the majority of cases, that are recorded in proof of the powers of the bark in mortifications, are of this kind; if Mr. Pott was right, and the bark had no influence, it is certain that all the successful cases must have stopped spontaneously, agreeably to Mr. Sharp's opinion.

In addition to Mr. Pott's evidence of the inefficacy of the bark, Mr. Power has given a case of mortification of the toes and feet, in which he asserts that all the remedies commonly made use of were tried in vain; but we are informed that he ultimately succeeded by the application of fermenting cataplasms\*.

In one instance the efficacy of the bark is objected to, for the purpose

\* Medical Transactions, vol. 3.

of proving that opium is a specific in this disease; and in the second instance every other remedy is discredited that former practice had presumed to sanction; that a decided preference might be given to the salutary influence of fermenting cataplasms.

Without attempting to examine the particular merits of all these different statements and unqualified assertions, I shall humbly solicit the candid reader's attention to the only rational inference that this diversity of opinion will admit of. If the bark is not an efficacious remedy, we must then acknowledge that all those successful cases, where this medicine was depended upon, must have terminated spontaneously; and if opium is the only remedy, then all those successful cases, where opium was not given, must have stopped spontaneously; and consequently, if opium was not given in the case related by Mr. Power, that must also have terminated spontaneously; but as in this case all the remedies commonly employed were tried in vain, all former cases must have terminated spontaneously, and this have been cured by the application of fermenting cataplasms.

One circumstance particularly merits our attention; when the experiment had been once tried, and fermenting cataplasms had been used with supposed advantage, we are informed that the disease again returned. On this occasion it would certainly be reasonable to suppose, that as this new remedy had in the first instance proved efficacious, it would have been immediately had recourse to on a return of the disease. But from whatever motive they were again made use of, we meet with this satisfactory information in the sequel that this mortification also, after other means had been first tried, was stopped by the fermenting cataplasms.

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If this new application proved useful in the first instance, why should any other means be first tried in the second; and why should not the most efficacious remedy have the preference? But the reason is too obvious to require further explanation; for the truth is, that every one of these writers, without exception, have each endeavoured to support his favourite hypothesis. And if we critically examine any of these cases, and compare the whole together, we shall find that the question still remains undetermined; whether the boasted cures depended on the influence of the respective remedies, or whether they were all spontaneous terminations of disease.

If this spontaneous termination of disease was limited alone to cases of mortification, it would then appear less singular that any circumstance of such importance should have passed unnoticed. I am ready to acknowledge, that in many instances it is a very difficult question to determine, how far the salutary process was the consequence of medicinal agency, or whether it depended alone on the powers of the constitution; but in some cases the powers of medicine are very obvious, although in others they are equally obscure.

The bark is certainly a powerful medicine, and its influence becomes immediately conspicuous on many occasions; but what appears most singular in the present instance, is the uncertainty of the evidence on which the reputation of this medicine was first established in cases of mortification.

The arguments of Mr. Shipton are in general the offspring of conjecture, and he amuses himself and his readers with speculative opinions respecting

respecting the comparative powers of the different preparations of the bark, and asserts that half the quantity of the resin or extract would answer the purpose in cases of mortification, because it is supposed that these respective doses are equally efficacious in intermittent fever; and immediately afterwards he endeavours to prove that these two diseases have not the least resemblance to each other. But what is still more unintelligible, this ingenious writer has before informed us that the bark is not a proper remedy in intermittent fevers; in which he "observes that the use of the bark is generally noxious and sometimes fatal."

I shall not attempt to reconcile all these contradictions, or take upon myself to set in a clear point of view a subject that appears to me inexplicable. These cases have been repeatedly copied by others because they were supposed to contain indisputable evidence of the salutary powers of the bark as a remedy in mortification. I have given my opinion in plain terms, and the public must determine. But if these case writers were so unfortunate first to impose upon themselves, as I think it impossible that such a system of confusion could have been formed by design, it would be difficult to conjecture by what magic art the delusion was transferred to the public at large; and, for my own part, I should never cease to wonder, if I had not previously examined the dark history of human nature, and was well convinced how much the world is gratified by imposition and deceit.

SECTION

## S E C T I O N IX.

### THE CHIRURGICAL TREATMENT OF THOSE DISEASES WHICH ARE THE IMMEDIATE CONSEQUENCE OF EXTERNAL INJURY.

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THE difficulty of prescribing a rational system of chirurgical applications, has in all probability prevented the best informed writers from attempting to lay down any specific directions, or to give a full explanation on this subject. If we examine the works of those who may be considered practical writers, we shall find their books filled with a miscellaneous variety of prescriptions, whose medicinal powers it would be impossible to investigate.

But the more modern authors have adopted a method still less intelligible; and instead of giving an exact account of the whole method of treatment, they have expressed themselves in general terms; and, not having condescended to give any additional explanation, either of the external applications, or plan of medicine that would be necessary under different circumstances, this important part of the subject still remains in a state of obscurity.



It may perhaps have been considered beneath the philosophic dignity of modern surgery, to attempt to investigate the properties of a white-bread poultice, or explain the effects of a warm bath, or fomentation. But the few useful remedies, that the art of surgery is in possession of, are of the simple kind; and in many instances it will be found that their excellence depends more on their innocent simplicity than their active powers.

I am rather apprehensive that many writers have cautiously avoided expressing their sentiments on this subject, either from a fear of exposing the narrow limits of their own abilities, or to avoid the danger of betraying the humble state of their profession. With respect to the treatment of mortification, it is an object of the first importance, both in theory and practice, accurately to mark the progress of the disease, and to distinguish the termination of inflammation from those consequences which require a very different method of treatment. It was for the purpose of detecting this inaccuracy, that I have examined with such attention what has been already written on this subject; as I should not have supposed that the public would give me credit for such assertions, if I had omitted to bring written evidence of their authenticity.

In many instances of slight accidents, it is frequently very immaterial what method is made use of; but in cases that are likely to be productive of dangerous consequences, a little error, at the commencement, may inevitably determine the fate of the patient.

The materia medica of surgery is certainly very limited, and if we except

cept the caustic applications, they may be considered much more insignificant than powerful; and yet an accurate discrimination will, on many occasions, be attended with evident advantages.

It will not be necessary in the present instance to examine the boundless extent of written evidence, as I am of opinion that the whole may be brought into narrow limits; but, if any one should be of a contrary opinion, I shall always be ready to answer any objections that may be sanctioned by authority sufficiently respectable to be considered worthy of public attention.

For the purpose of illustrating the powers and properties of surgical applications, I shall state a few instances that may be supposed to require a variety in the method of treatment. If we were to divide the subject into different parts, and afterwards separately examine the merits of each particular question, the first would be, whether in cases of contusions, fractures, wounds, &c. &c. it would be more advisable to make use of surgical applications, or whether it would be better to leave the whole to nature.

This at first view may appear to be a very unnecessary question; yet notwithstanding all the acknowledged advantages of a rational and well directed system of practical surgery, every attentive observer must have met with frequent instances, where the method of treatment has proved an impediment to the cure of the disease. Sharp, Pott, and many other writers, mention mortification being the effects of tight bandage, as if it was a familiar circumstance; and in all those instances where the bandage  
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proves to be the cause, it is certain that the mortification would not have taken place if the bandage had not been applied. The unfavourable position in which fractured limbs are frequently placed, the intolerable incumbrances of rollers, splints, and fracture-boxes, furnish us with an inexhaustible fund of argument in support of this assertion.

How frequently do we meet with instances where slight wounds, that were originally trifling and insignificant, are miraculously converted into ill-conditioned ulcers; which uninterrupted nature would have protected with a scab, and the whole have peeled off without the least trouble, pain, or inconvenience. But such is the partiality of the public to professional parade, that it is frequently necessary to perform operations either for the purpose of amusing the patient, the satisfaction of the public, or the protection of our own reputation.

In support of this opinion, let us suppose that an accomplished surgeon has a case under his care, that is in a regular progressive state of recovery, and in which he is certain that no operation is necessary. If, in such a case, the patient thinks the recovery tedious, becomes dissatisfied, and is determined to call in additional assistance; if any insignificant operation should be then performed, the first surgeon will loose his reputation, and the second have the credit of the cure. A Gentleman, to whom I am under the greatest obligations, and whom I would wish to serve in the best manner that my humble abilities would admit of, had the misfortune by a fall from his horse to receive a deep contused wound on the fore part of the head, by which the os frontis was laid bare for a considerable extent; but there was not the slightest symptom of any further injury. As this case ap-  
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peared more formidable to my patient and his friends, than it did to me, I was suspected of possessing only a superficial knowledge of my profession, because I insisted on the propriety of only making use of superficial applications; nor would his friends rest satisfied, until they had procured the sanction of another surgeon's opinion. Strange as it may appear, we were both of one mind, and our patient escaped without either scalping, or trepan.

But if in this instance, instead of doing all that was necessary and no more, I had complied with their apprehensions, and urged the necessity of some capital operation, my professional heroism would in all probability have met with general approbation and applause; and thus, by one dexterous stroke of the knife, I might have established my reputation for ever.

In cases that are slow in their progress, and where a considerable length of time is necessary for effecting a cure, though all may go on well, yet the parties frequently become dissatisfied, if something is not done to amuse their minds, and divert their attention. I well remember a curious instance of this nature, where the extensor tendon of the middle finger was wounded with a piece of pot. When I first saw my patient, the inflammation was considerable over the whole of the back of the hand, and the discharge from the wound indicated a state of imperfect suppuration, the tendon began to slough away, and the disease proceeded in two directions, the one towards the finger, the other took the course of the muscle up the arm.

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When the first suppuration had subsided, a second inflammation took place, by which the integuments and the fascia of the muscle were united, and another tumour formed, which terminated like the former; and thus the disease went on by short stages and tedious progress, till it arrived at the origin of the muscle, in the outward apophysis of the os humeri. In this situation of affairs the confidence of the parties became exhausted, and they wished for additional advice. If another surgeon had been consulted, and he had differed in opinion, I might have lost both patient and reputation; I therefore recommended a physician, under whose sacred auspices I flattered myself that both would be secure.

The Doctor was of opinion that the disease was of the fistulous kind, and that the knife was the only remedy that was likely to arrest its progress; and recommended a liberal incision through the whole extent of the then existing tumour. My object was to reserve my own opinion, to oblige my patient, and do as I was bid. Such was the humility, candour, and liberality, with which I conducted myself on this occasion; and I was happy in the opportunity of obtaining the sanction of another person's opinion for an experiment that in my own mind I disapproved.

I should not have thought myself justifiable, if I had acted contrary to my own judgment, even though it had been with the full consent and approbation of my patient; as that would have been a species of experimental practice, that few I think would presume to sanction. But when a second person is consulted, who has the confidence of the patient, and takes upon himself the responsibility, it is my opinion that his directions should be implicitly complied with, whether right or wrong.

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With this cautious consideration, then, I took up the knife, and divided the tumour through its whole extent; a copious discharge of fluid matter immediately followed, but the sloughing of the fascia continued for a considerable time afterwards.

If the disease had terminated here, we should have been induced to attribute the success to the incision; but subsequent inflammations took place in regular succession, and I think the last exceeded all the preceding both in degree and extent, and I am well satisfied that the disease did not terminate till the whole fascia was destroyed. Now as this process could not be either retarded or accelerated by the incision, we have every reason to conclude that the operation was unnecessary; and that it only served to amuse the patient.

These are not imaginary cases invented on the spur of the occasion; for if necessary I could appeal to the first professional authority in support of the facts I have now brought forwards. Not that I shall here presume to take upon myself to determine who is the first surgeon, or who the first physician in Great Britain; the two alluded to may have their equals; but if any one should venture to come forward in propria persona, and demand precedence, I flatter myself that it would not prove a very arduous task to oppose their claim, and defend the rights of the heroes of my page.

If such then is the state of the public opinion in favour of chirurgical operations, it would be in vain to contend against their too frequent use; the hopes of relief will always induce the afflicted to look forward for assistance,



tance, and if the most formidable remedies give the greatest confidence of success, they will frequently be preferred to those of an inferior order that have less influence on the mind.

It is not against either the utility or necessity of operations and applications that I wish to urge objections, but it is against the abuse of these remedies that I am now contending; the chirurgical works of supererogation it is our duty to expose. The utility of external applications is established on the experience of ages; it was originally the offspring of instinct\*; it is protected by reason, and still sanctioned by general approbation.

On some occasions the use of the knife and other powerful applications become necessary; but, in general, the more mild the method of treatment, the greater will be the probability of success, and consequently the most passive remedies are frequently the most efficacious.

In the largest wounds the principal object of the surgeon is defence, by which the parts are protected against the influence of the air and the effects of external cold. In that useful animal the horse, the operations of nature are so powerful, that protection will in general prove prejudicial;

\* This too serves always, Reason never long;  
One must go right, the other may go wrong.  
See then the acting and comparing pow'rs  
One in their nature, which are two in ours;  
And Reason raise o'er Instinct as you can,  
In this 'tis God directs, in that 'tis Man.

Pope's Essay on Man.

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and, if external applications are made use of, the luxuriance of the granulations will bid defiance to restraint, and the new flesh will rise so fast, that neither bandage nor caustic will prevent its growth.

The healing process had used to be divided into three stages; digestion, incarnation, and cicatrization; and I am ready to admit that these operations of nature may be either promoted or retarded by the influence of external remedies. But it will in general be found, that their merits depend more on their passive than their active virtues. If then protection is the great object that we have in view, the next question will be, to determine on a proper choice of remedies for this purpose, and to select and arrange the different powers of surgery to the greatest advantage.

Perhaps at first view this subject may appear so plain and self-evident that by some it may not be thought worthy of attention; but as it is not yet determined under what circumstances moist or dry applications should be made use of, the subject must certainly still be considered in an unsettled state.

Plaisters and ointments are the common dressings that are applied to wounds and ulcers. But flour and lint have for many years past been made choice of, as the first applications in cases of amputation, even in the largest wounds of this kind, when the operation is performed above the knee.

In cases of cutaneous inflammation, without wound or ulcer, it seems to be a matter of great indifference whether moist or dry applications are

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the objects of the surgeon's choice. In the gout combed wool is frequently recommended, as a soft, warm, and rather oily application. In erysipelas, the parts are sometimes dusted with fine flour. I well remember an anecdote of a facetious physician obtaining wonderful applause by dusting a Lady's face all over with hair-powder. And I once knew an instance where the powder of bark was prescribed as an application in this disease; and when the Gentleman (who was of Scotch extraction) asked for an explanation, the Doctor replied, that the Scotch always used oatmeal on such occasions, but that he preferred bark, as it served as a protection against the danger of mortification. Good God! exclaimed the astonished patient, whose solicitous attention did not permit a single word to pass unnoticed; I hope, said he, you do not see any reason for such apprehensions; to which the Doctor answered in the negative, but observed, that it was sometimes prudent to be upon our guard.

It is now some years since this circumstance happened, but as it appeared to be a curious method of practice, I must acknowledge that it made a lasting impression on my mind. If the application of powder of bark in cases of erysipelas is innocent and inefficacious, it may without doubt answer the purpose as well as oatmeal, wheat flour, or hair-powder; but if in such cases it is made use of on account of its stimulating powers, as a tonic or antiseptic, it certainly must be improper in an inflammatory disease. And here it may be necessary to observe, that the prevention and cure of mortification are two distinct indications and consequently require very different remedies. I have seen fractured limbs laid in combed wool, which is perhaps one of the most innocent applications that can be made use of, and innocence is a virtue in surgery that merits our attention.

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If then we should at last discover that those applications are best which are most inactive, we shall have some motive to direct our conduct; and whim and caprice may cease to influence the practice of surgery.

I well remember the time when fractures had used to be treated with all the parade of rollers, splints, fracture boxes, and cradles; and I am ready to give evidence, that I have witnessed a number of instances of perfect and speedy recovery under this oppressive method of treatment. But I am so well satisfied and convinced of the impropriety of this method of practice, that if I was under the unavoidable necessity, either of making use of this load of apparatus, or of trusting a fractured limb solely to the protection of a soft pillow, I certainly should prefer the latter.

If in many instances I am induced to depreciate some of the imaginary powers of surgery, I do not intend at the same time to diminish the importance of the profession. My object is to give a rational estimate of the different parts, and by a general representation to illustrate the importance of the whole; and thus by plain and unadorned description to set a mysterious subject in a clear and perspicuous point of view.

Perhaps by some I shall be accused of expressing myself in too plain language, and censured for betraying the little secrets of our art. But here let me tell those presumptuous readers, who think that they can learn the practice of physic and surgery from reading a single book, that the grand secret cannot be disclosed to any, but those who have been regularly initiated, and previously acquainted with the mysteries of the profession.

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It not only requires an accurate anatomical knowledge of the injured parts, but the animal system at large should be previously understood; it will also be necessary to form a judgment of the nature and extent of the disease, and these objects include an extent of information not easily to be procured. It is no very difficult task to publish a long catalogue of diseases, with a description of such medicines as are in general use; but it is not equally easy to communicate a critical knowledge of those diseases, or to give an intelligible description of animal nature.

A person ignorant of these subjects may be told what remedies are necessary on certain occasions, but it is the man of science only that can apply a bit of dry lint, or the most simple plaister, with propriety and advantage.

I have already examined what has been said by others on warm and cold applications, and shall venture to give it as my opinion that, in cases of contusions, dislocations, and fractures, warm applications deserve the preference. But in fractures we meet with difficulties that are not connected with contusion, or dislocation; as in fractures it is necessary that the limb should not be disturbed, but constantly continued as much as possible in the same position, which would not be consistent with the frequent repetition of a number of remedies that might with propriety be used in other instances.

In compound fractures, it is sometimes necessary to remove the bandages for the purpose of dressing the injured parts; but this may be done without disturbing the limb, and the external wound will sometimes heal  
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without a repetition of dressings. I have frequently in compound fractures seen the experiment tried with success, and have known the same applications continued till the wound was completely healed; and have met with several instances, where this method was attended with the most unquestionable advantages. I know this is a method recommended by Sir James Earle\*, and I do not recollect any other instance where this practice has made its appearance in print. But I am proud of the present opportunity of paying this tribute of respect to the memory of my friend, under whose care I received my first instructions; as this was a plan of treatment which he pursued with considerable enthusiasm, more than thirty years ago.

It is now above seven and twenty years since the first instance occurred that I was witness to; it was a fracture of the leg, by the shaft of a loaded cart falling upon it; the superior part of the tibia made its way through the skin, about the middle of the leg. After the fracture was reduced, the wound was covered with a plaister of some mild ointment spread upon lint; and the limb was surrounded with what is called an eighteen tailed bandage; and the dressings were not removed for the first fortnight.

When the parts were again examined, the wound was found nearly closed, dry lint was then applied, and the whole covered with a plaister bandage; at the end of another fortnight the parts were again examined, and the applications renewed, when the wound was found completely healed.

I shall not presume to comment on this case, as it happened at a time when my judgment was premature; but the facts may be depended upon

\* Pott's works, by Earle, 1790.



as here stated. I am not in the least apprehensive of becoming an enthusiast myself in behalf of any one method of practice, or a blind zealot in compliance with any favourite hypothesis; but I am well convinced that, in a general view, this method of treating compound fractures is worthy of attention.

If the science of surgery would admit of a full and general explanation, we might then flatter ourselves with the hopes of establishing a system of practice on first principles. But as the art of surgery is not yet reduced to scientific certainty, this subject will perhaps be best illustrated by stating the different circumstances in which the respective remedies may be made use of with the most rational prospect of success. By these means I hope we shall be able to analyze the subject, and investigate the narrow limits of this branch of the profession.

Respecting the use of external applications, they will vary according to circumstances; and for the purpose of illustration let us first suppose the case to be a contusion of one of the extremities, without either wound of the integuments, or fracture of the bone. I am willing to allow, that in most instances the effects of these simple injuries would of themselves subside, and that time alone would complete the cure. But at the same time I am as well convinced not only that, under such circumstances, surgical applications may be made use of with advantage, but that sometimes they are absolutely necessary.

Perhaps warm fomentations are the most efficacious remedies that we are acquainted with, and as we do not meet with any contraindications in  
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such simple cases, consequently we shall not be limited in our choice. The parts may be fomented with warm water, vegetable mineral water, or oxycrate, which ever the parties may prefer. If the injury is extensive and a copious application is necessary, warm water will be most convenient; and if the integuments are not inflamed, the parts may with propriety be afterwards rubbed with volatile liniment, this will act as an external stimulus, and like all other rubefacients will by transferring the irritability to the surface contribute to diminish a more deep seated disease. But in cases of wounds or inflammation of the integuments stimulating applications would be improper. And for the same reason, when the integuments are injured, oxycrate would also be improper. So that we find that, simple as these remedies may appear at first view, we have some criterion by which to direct our choice.

I have frequently seen instances where accidents, that were originally insignificant in themselves, have by such little errors in the method of treatment become important, and have sometimes had a long attendance to cure a disease which was the consequence of improper remedies.

But I have seen cases where the skin was not affected and where stimulating applications were inefficacious. I remember an instance of a violent bruise on the muscles of the thigh by the kick of a horse, by which the cuticle and other integuments were very little injured, at the same time that the deep seated injury of the muscles was perceptible to the touch. The pain was distressing in the extreme and continued for some weeks; in compliance with the dictates of long established custom, the patient was bled, and other evacuations by means of calomel and salts were

were afterwards made use of. The injured parts were well fomented night and morning with flannels wrung out of hot water, and afterwards rubbed with strong volatile liniment, but the pain continued and was only alleviated during the night by means of powerful opiates.

I hope I shall not be suspected of misrepresentation, as I am conscious that it is difficult on such occasions to describe with accuracy without incurring the appearance of empirical exaggeration. But so much was I apprehensive that the case would prove tedious and the parties become dissatisfied, that I expressed a wish that my patient, who was a Gentleman's servant, might be admitted into a neighbouring infirmary. If an empiric wanted a case to recommend a nostrum, I am ready to acknowledge that one like this before us would be very convenient for his purpose.

The next application, that was made use of, was an embrocation of equal parts of Gowland's extract and oil, with which the parts were plentifully rubbed three or four times a day. This in a few days produced a numbness in the parts nearly approaching to palsy, and the pain consequently ceased. There was nothing particularly interesting in the subsequent treatment, and the patient in about a month's time was perfectly recovered.

I am well convinced that this case is in direct opposition to the previous plan of treatment; the injury was deep seated, and neither warmth nor stimulating applications were efficacious; it too clearly illustrates the difficulty of establishing a general system of practice, and evidently proves what a wide uncultivated field we have before us for the exercise of professional



feffional ingenuity. The state of the public opinion respecting the use of warm and cold applications in some instances has been already discussed, but what degree of heat is preferable on different occasions has not been yet determined.

When the injury is limited to the extremities, a greater degree of heat may be admissible, and applications may perhaps be made use of in such instances more warm than would be necessary or proper under other circumstances, without being productive of any very important inconveniences. But when the seat of injury is in the external parts of the abdomen or thorax, then more caution becomes necessary; and it sometimes happens the viscera are so much affected by external injury, that the disease may terminate in mortification.

I know of no instance where the effects of the warm bath are so conspicuous as in inflammations of the abdominal viscera; and yet, notwithstanding its great efficacy, I think it is one of the last remedies that should be made use of. If a patient, under such circumstances, is plunged into a hot bath instead of a warm one in the early state of the disease, and without previous evacuations having been employed, instead of producing a salutary effect, I should be apprehensive of the most dangerous consequences. But if by copious bleeding and a liberal use of purgative medicines the least abatement of the symptoms is obtained, it frequently happens, at this critical period, that a judicious application of the warm bath will produce a complete solution of the disease.

In the first volume of the Edinburgh Medical Commentaries, we meet  
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with an abridgement of a dissertation on the warm bath, that contains some very judicious remarks on this subject; and as the original is in all probability now out of print, I should think that a translation would at this time be very acceptable to the public. But as these are not to be had, I shall beg leave to make use of such information as is now before me.

The author says, "When the water in the bath raised Fahrenheit's thermometer to 96 degrees, he found that the heat of the body and the pulse were either not changed, or were so in a slight degree only. With the water at 98 degrees, the heat of the body was not changed; the pulse was very little quickened; and, after an hour, returned to its natural state. The face was somewhat swelled and red, and was also a little moist; but there was no apparent sweat upon it. After coming out of the bath at this heat, the pulse seemed less frequent than natural, and a very copious perspiration ensued.

"At a hundred degrees, in a man whose pulse was naturally sixty, after twenty-five minutes continuance in the bath, it was raised to seventy-two, and became fuller than natural. The heat of his body was increased two degrees, his face began to sweat, but not copiously. The superficial veins in other parts of the body were scarcely swelled; the cuticle was much wrinkled; and, at length, some degree of giddiness came on. After coming out, his pulse seemed slower than natural, and there was no sweat, but a copious perspiration. At a hundred and two degrees the pulse, in half an hour, was increased thirty-two strokes in a minute; and the heat of the body was augmented four degrees. The face soon became flushed; and, after ten minutes continuance in the bath, sweat stood in drops upon it.

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On coming out, the person was put in a bed between blankets, and sweated profusely. But, in a short time, the pulse and heat of the body returned to the natural standard. At a hundred and four degrees, the pulse and heat were as much increased in twenty minutes as in the last experiment after half an hour. When the water came up to the thorax, the breathing was frequent and laborious. The superficial vessels were much swelled, and the face very red, while the sweat ran down it in full streams. The cuticle continued smooth, and there was no remarkable anxiety; but, after twenty minutes, a slight vertigo ensued. The sweat, upon coming out of the bath, was very copious; and it was a quarter of an hour before the heat and pulse returned to the natural standard. At a hundred and six degrees, all the symptoms mentioned in the last experiment were much increased. The heat of the water was almost intolerable. A vertigo and confusion came on in five minutes; and, in a quarter of an hour, nausea and faintness ensued. On coming out, the sweat was still more copious than before. The heat of the body soon returned to its natural state; but, even after half an hour, the pulse still continued fuller and quicker than natural.

“The effects of the pediluvium were nearly the same with those of the warm bath; but the changes from equal degrees of heat were less considerable. The vessels in the feet were soon swelled from it; but it required some time before any change took place in those of the hands\*.”

If the increased action produced by the warm bath is as here stated, I should think that the heat of the water in inflammations of the abdomi-

\* Edinburgh Medical Commentaries, vol. 1, page 297.



nal viscera should not exceed a hundred degrees. In some chronic diseases we know that the hot waters of bath, which at the fountain head are at a hundred and twelve degrees, are frequently made use of with safety and advantage. I have frequently attended with great care to the management of the warm bath, but cannot say from my own experience that I have been able to form a set of general rules, or establish a system of practice, worthy the attention of the public. The effects of the warm bath will frequently appear satisfactory to the superficial observer, whilst the penetrating eye of judicious criticism will see through the delusion; in many instances the remedy may be applied when the disease is in a sinking state and the event is certain, but the powers of any remedy can only become conspicuous where the event is uncertain and the salutary change depends on the effects of the applications.

I shall not attempt to form a new system of observations on the powers of the warm bath, or to repeat the experiments above-mentioned, as I had much rather that this part of the argument should rest on any authority in preference to my own; for if I was to make a number of experiments for the purpose of forming a basis for a new hypothesis, I might then be suspected of accommodating the facts to the nature of the argument. But I wish as much as possible to avoid the speculations of theory, and have endeavoured to state plain facts, and unadorned opinions; the one free from disguise, the other clear from obscurity.

If we attentively review the practice of surgery, we shall find that warm fomentations are on many occasions looked up to as an important application; they are not only used as a remedy for inflammation, but they  
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have also long been considered as the anchor of hope in cases of mortification, with hot stupes, melted ointments, &c. &c.

This may appear at first view rather singular, that warm fomentations should be used for two opposite kinds of disease; but when we recollect that the whole business in such cases is to prevent mortification taking place, and not to restore life to parts already destroyed by the malignancy of disease, our astonishment will in some degree subside.

When a part is once dead, it will be in vain to attempt to restore that part to life; our object is to prevent the progress of destruction by terminating the previous disease before mortification has taken place. It is a disease that may be prevented or arrested in its progress; but having once taken place it does not admit of cure. But this subject will be more fully explained when we come to examine the treatment of mortification; and for the purpose of illustrating in what instances the different kinds of applications have their respective preference, I shall now proceed to state another instance of external injury.

The last statement was a case of contusion without injury of the integuments or fracture of the bone; and that we may proceed in this inquiry by regular gradation, I shall next mention what is called simple fracture, with slight contusion, without injury to the integuments.

This is a case in which the liberality of nature appears singularly conspicuous, and being a common accident the pretenders to this branch of surgery are very numerous, in consequence of which it frequently hap-

pens that the patient meets with very severe and irrational treatment. It is a business that is supposed to be so perfectly understood, that a single additional observation may by some be censured as superfluous; and, if it was only for the purpose of giving prescriptions for the treatment of simple fracture, I should not have introduced the subject on this occasion.

But this is not the ultimatum of my views; my present object is to examine the different degrees of external injury, and point out a rational method of treatment through a progressive series of disease.

It will not be necessary to make any observations on the position of the limb, as that part of the subject has already been discussed with such ability by Mr. Pott; and it would be a reflection on the reader to suspect that he is not well acquainted with all that has been already written on this subject.

The first object in cases of this kind is the operation of reduction; and as far as I can form a judgment on the present state of the public opinion, I am rather suspicious that the many cautions, that have been given against attempting to reduce a fracture after inflammation and tension have taken place, have given rise to unnecessary apprehension, and have too frequently proved the cause of unfriendly delay.

In all cases both of fractures and dislocations the apparent tumification will be much increased by the deformity; but independent of this species of misapprehension, in instances where the inflammation and tension have  
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taken place to a considerable degree, I am of opinion that the operation of reduction will, in general, be attended with less inconveniencies, than what would be occasioned by the unnatural situation of the parts.

When either dislocations or fractures are reduced, the patient is in a great degree immediately relieved from pain; and I am much disposed to differ from the general opinion, and think that it rarely happens, that the reduction may not be attempted with safety.

I do not pretend to assert that the inflammation and tension may not sometimes be so great as to demand a cautious conduct on behalf of the operator, and I am well convinced that it is impossible to lay down invariable rules on such occasions. But I shall here notice one circumstance, which I do not recollect having been mentioned by my predecessors, that does sometimes occur, which might embarrass the young and inexperienced, and consequently may be thought worthy of attention. A considerable degree of tumefaction sometimes takes place in cases of simple fracture, which is neither dependent on inflammation nor the deformity of the parts; the instances of this kind that I have met with have been in fractures of the tibia; this swelling appears to be of the œdematous kind, and gradually subsides on pressure, and seems to me to be occasioned by an extravasation of lymph, in consequence of a laceration or rupture of some of the lymphatic vessels.

In the first instance that I met with, the tumefaction was so great as, at first view, to induce me to suspect that it would be improper to attempt reduction; and I had determined only to foment the limb, to apply a flannel

nel roller soaked in warm oxycrate, and defer any further proceedings until the next day. But on removing the limb for this purpose, and for the more accurate examination of the nature and extent of the injury, I found on the application of gentle pressure that the tumefaction gradually gave way, and that the ends of the fractured bones were without much difficulty brought in contact with each other; whereas it is probable that, if the operation had been delayed, inflammation and tension would have taken place, and the difficulty of reduction have been considerably increased.

It is not merely for the purpose of laying down a plan for the treatment of simple fractures that I think necessary to dwell upon this subject, it is not alone for the sake of giving directions in such simple cases, but to shew that our choice of remedies, simple as they may be considered, do not depend alone on either whim or caprice; and to prove that we are not destitute of rational motives to direct our conduct on such occasions.

Under the supposition that warm fomentations would be necessary, I certainly should consider it a matter of indifference whether warm water, vegetable mineral water, or oxycrate were made use of; in cases of simple fracture they would be equally efficacious as a warm fomentation; but when all circumstances have been considered, not a doubt can remain but vinegar and oil must have the preference. A flannel roller is soft, warm, and elastic, and for these reasons will answer the purpose better than one made of linen, and as vegetable mineral water will not readily unite with flannel, it will consequently prove inconvenient and improper; whereas

whereas oxycrate will better serve to render the flannel roller a moist and easy application. With respect to splints of all kinds, I think they will at best only prove a useless incumbrance, and if any application of this sort is thought necessary, a single or double piece of pasteboard soaked in warm oxycrate, and placed between the folds of the roller, is the only instrument that is admissible. But it is my opinion that a soft pillow and an easy position of the limb are the most important objects that merit our attention in such cases.

It will not be necessary to examine all the different kinds and degrees of contusions, wounds, and fractures in every possible variety of combination; as all these circumstances will come under our consideration, and the whole be united in one general view, in the treatment of compound fractures.

When contusion, wound, and fracture become the united consequence of the same cause, it may be considered one of the most formidable combinations of external injury that the art of surgery has to oppose. And though it frequently does happen that such injuries take place under such favourable circumstances, that the recovery is both expeditious and complete, yet there are certain degrees of injuries of this kind that require the utmost exertion of surgical assistance; and in many cases it unfortunately happens that mortification is inevitable.

In this last instance amputation must ultimately take place; but as my present object is to attempt to point out what is the most probable method of preventing mortification in the first instance, or of stopping the pro-

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gress of the disease when it does occur, I shall not make that operation an object of our present consideration.

In cases of compound fracture, if the wound in the integuments is small, it will not in general be necessary to remove the dressings for a considerable time, perhaps for a fortnight or three weeks; and the whole treatment by this means will be rendered similar to that of a simple fracture. But let the wound be more or less extensive, it certainly cannot be necessary to remove the dressings previous to the commencement of digestion, when we shall have passed by the first danger of mortification with safety. So that we evidently avoid every objection to this method of practice during the first period of the disease. Even if fomentations are thought necessary, they may be applied without removing the bandages, and we cannot have any motive for opening the wound before digestion has taken place.

Whether the wound be large or small, we will suppose it to be protected with proper dressings, and the whole of the injured parts surrounded with flannel in the form of the eighteen tailed bandage. Let us here consider what additional assistance can be given during this critical momentous interval, before the commencement of digestion. The judicious application of warm fomentations seems to be the only external remedy that can be made use of with any rational probability of advantage; it appears to be the last resource we have to depend upon, the *ne plus ultra* of our hopes.

The next question will be what kind of fomentation will claim the preference, and in what manner it may be applied with the greatest probability

ity of success. It certainly would be improper to make use of fomentations in such a manner as to wet the bed and render every thing damp and cold about the patient; for under such circumstances the injured limb and neighbouring parts would be in a state of additional heat during the application of these fomentations, and for the succeeding interval the whole body would be exposed to the unfriendly influence of damp surrounding cold.

If the wound was small and well protected, the bandages might be moistened with warm oxycrate, or equal quantities of spirit of wine and water of a proper heat: but if the wound was large, either of these applications would be improper, as they would probably penetrate into the wounded parts and produce painful irritation.

If the inflammation should be extensive and the tension considerable, it might then perhaps be thought proper to have the whole limb fomented by means of flannels dipped in hot water and afterwards wrung out dry, which would be more similar to a vapour bath than hot fomentations; and if, after such applications, the limb should be covered with a succession of warm dry flannels for some time afterwards, there will be but little reason to be apprehensive of the unfriendly effects of damp and cold, in consequence of the fomentations.

If then the remedies with which we are furnished are so limited, the greater judgment will be necessary in the regulation of our conduct. But as this is certainly the most critical period of the disease, the advantages that may be expected from the co-operation of internal remedies particularly

larly merit our attention, for which I shall refer the reader to the following section, and shall confine the present discussion to the surgical department.

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## EXTERNAL TREATMENT AFTER THE FIRST CRISIS.

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WHEN the crisis of the fever has taken place, and the bark been once administered, it will then be necessary to determine whether the wounded parts are to be examined or not.

If the injury to the integuments is very extensive, even if the muscles have escaped, it will then by most bethought proper to examine the state of the parts and remove the applications. But if absorption has taken place, I am of opinion that it will at this period have become a constitutional disease, and that a putrid diathesis must be the immediate consequence, and under such circumstances, we have too much reason to be apprehensive that it is of very little importance what plan of treatment is made use of. But if any hopes remain, it seems rational that warm applications should have the preference, for the purpose of supporting the energy of the vital powers, and meeting the reanimation of returning health.

When fomentations are made use of, flannels wrung out of hot water  
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will answer every purpose; as for the vegetables such as wormwood, rosemary, chamomile, &c. &c. that are frequently boiled in the fomentations, they may serve to give an air of mysterious importance to the practice, but will not add to the efficacy of the application. If warm fomentations contribute to diminish the tension of inflammation, it must appear rather singular that the same remedy should give energy to the vital powers and oppose the debilitating influence of approaching mortification; and on the idea that inflammation and mortification are opposite diseases, and consequently require opposite remedies, it must certainly appear more consistent at first view to adopt Mr. I. Hunter's plan of cold applications in cases of mortification.

But cold does not appear to be a remedy well calculated to revive the powers of life.

In cases of what is called suspended animation, the application of external heat is recommended in a variety of forms; and in cases of approaching mortification, where the vital powers are sinking, is it not equally reasonable to suppose that the cordial influence of reanimating warmth would prove a salutary application? If then inflammation and mortification are opposite diseases, in direct opposition to Mr. I. Hunter's opinion, I should use cold applications in cases of inflammation, and warm ones as a remedy in mortifications.

But if, as has been before stated, our object on these occasions is to prevent the progress of mortification and not to restore dead parts to returning life, then we shall find that we are still treating an inflammatory disease.

Inflammation is the morbid action that, in this instance, becomes destructive of life: when mortification takes place the vital actions end.

But if warm fomentations are thought proper during the progress of inflammation, though warm applications may be equally necessary after mortification has taken place, yet moist applications would be attended with more inconvenience in this instance than at a more early period of the disease; and in my opinion a very warm dry flannel would prove a much more convenient application than a moist one. But whilst I am presuming to give directions on this part of the subject, I would wish to remind the reader that it is only a matter of opinion, and not a subject that admits of demonstration; and as it has been already proved that there is no public opinion to appeal to, I think it right to give one, although it may be considered equally imperfect. For the question certainly presents itself with irresistible propriety, that if every former method of practice is to be rejected as erroneous or prejudicial, what must be substituted in its stead?

If we examine the opinions of ancient writers we shall find that excessive heat and not moderate warmth was the grand agency of surgery, hot digestives with turpentine were applied to the ulcerated parts: Wiseman recommends unguent basilic. cum ol. terebinth. hot \*, as a mild dressing

\* "In the dressing of these Mortifications, you ought to consider well in the application of your Medicaments, that you do not in the extinguishing one Gangrene raise another, by the too long use of sharp Medicaments. Therefore, when you shall feel the Ulcer warm, and find it cease gleeing, it may be reasonable to forbear the use of them, and to dress it up with warm Digestives, as *unguent. basilic. cum ol. terebinth.* hot: and after Digestion deterge with *mundif. ex apio magist.* or such like, according as the Sloughs require: then proceed by Sarcoticks and Epuloticks, as in such Ulcers hath been shewed." Wiseman's surgery, page 435.

of an inferior degree to what was at first made use of. But as the case copied from Mr. Douglas contains a full description of this method of practice, and comes rather nearer to the present time, I shall refer the reader back to the last section. If some mild digestive ointment spread upon lint is made choice of as the first application to the ulcerated parts, it may be proper to warm the plaister to a degree rather above blood heat, by which it will be rendered soft and readily run into the interstices of the parts, and by that means come in contact with every part of the ulcer; and, whatever may be the extent of the wound, this will make a proper application.

But on this occasion it will never be necessary to make scarifications; to cut the dead parts can be of no use; and, if the living parts are injured, the operation must prove highly prejudicial. If it is necessary to introduce warm applications into the interstices of the parts, it is not necessary to make divisions for the sake of filling them. One great object on this occasion is to exclude the air, and as you cannot wipe it out, or pump it out, the only method is to put some more solid and more friendly substance in its place; but, if incisions are made only in the dead parts, they will be immediately filled with air.

We have heard of heroes in the heat of action making bulwarks of the dead; but to cut through the mortified parts in this instance is like removing the impediments for the enemy's introduction. The dead parts will be removed by the powers of nature, and the art of surgery does not possess the means of anticipating the progress.

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When the first applications have been accurately adjusted to the parts, our next object will be to protect these dressings and retain them in their proper situation. On this occasion I have no predilection for any one particular kind of application, or any nostrum to recommend; and if I may take the liberty of making a few observations in my own behalf, I hope I shall not be suspected of professional bigotry or blind enthusiasm, whenever I presume to give my own opinion. Perhaps tripharmacum spread upon linen rag may prove a convenient application, it contains vinegar which has been by some considered an antiseptic, and I am very ready to acknowledge that I have no arguments to urge against it.

The next object I have in view is rather more out of the common way; and as it was the fashion, when the science of medicine shone with much more splendour than it has done for some years past, for great men to boast of their new opinions and contend for the sacred right of discovery, for fear that this should be censured as a barren age and free from all such claimants, I shall beg leave to add the following as a new opinion.

I do not presume to say that, if it is accepted as such, I shall have much to boast of; but, now I have taken up my pen, I see no reason why I may not on some occasions profit by the examples of my predecessors.

Warm applications, we are told, have been applied because they are congenial to life; but when it is in the form of fomentation, if the renewal is not constant, instead of an application of warm steam, it will prove to be damp cold. But if warm dry flannels are applied instead of moist ones, then all these inconveniences are avoided; and if the skin is not inflamed, I  
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would advise that the sound parts of the limb should be well rubbed with volatile spirit, either by itself or in the form of liniment mixed with an equal quantity of oil; in the latter form the stimulus will be less powerful, but more constant, regular and permanent; and the oil will keep the parts in a moist and easy state.

When the vital powers become languid, as in case of fainting, I believe it is a general practice to apply volatile spirits to the nose; and if we admit their efficacy in one instance, which extensive experience and general consent seem to sanction, why may they not prove equally efficacious in exciting the languid powers of sinking life, in cases of approaching mortification?

At least this will prove an agreeable, convenient, and cleanly application; which is much more than can be said in favour of any plan of treatment that the art of surgery has made use of on this occasion.

In the choice of applications in cases of compound fracture, one great object should be to give the preference to those which will occasion the least disturbance to the fractured limb; the whole system should be so contrived that the dressings may be conveniently removed without disturbing of the limb; and though in some instances where the wound is small the same applications may continue for a fortnight or three weeks, yet when the injury to the integuments is extensive, and the bone so shattered that the broken parts are daily escaping from the wound, the necessity of frequent dressing becomes indispensable. But when a compound fracture has been placed in a proper position, and dressed with all possible care

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and circumspection, and proper bandages once applied, it will not be necessary either to remove or renew the dressings, till digestion or mortification has taken place.

I well recollect two cases that ended in mortification, in consequence of which the parties were all dissatisfied, and suspected that the mortification was the immediate consequence either of neglect, want of judgment, or inattention. But let me ask those, who have not been accustomed to consider the subject in this point of view, whether it is possible that any advantage can be obtained by removing the dressings previous to the period above-mentioned, and whether a repetition of applications will either promote the process of digestion, or prevent the commencement of mortification? They are the inevitable effects of the first crisis, and the business of medicine at this period is to restrain the morbid action, and we must wait the event.

The first instance, that I shall mention, was a corpulent woman about forty years of age, and independent of her corpulency in perfect health. Her foot slipped on a smooth stone floor, in consequence of which she fell, and fractured her thigh. The contusion of the integuments or muscles was insignificant; but, in consequence of the position in which she fell, the end of the bone perforated the skin. In this case the indications were to put the patient to bed, to dispose of the limb in an easy position, and protect the parts with mild and gentle applications; and this in my opinion is all that the art of surgery under such circumstances can afford.

If digestion takes place, we must regulate our conduct according to circumstances;



cumstances; but if it ends in mortification, it ought to be known that it was not in the power of surgery to prevent it.

In this instance the wound of the integuments was small, but it was through a large extent of cellular membrane, into which the air would inevitably enter when the bone was reduced to its original situation.

The patient, I have already observed, was corpulent and in full health, but there was no great laceration or contusion of the parts. If mortification had not taken place, it in all probability would not have been necessary to have removed the dressings until the adhesive inflammation had united all the parts, and new granulations had been formed; and if it had then been necessary to remove the applications, the air could only have approached the external opening of the ulcer, and the dressings might have been renewed without the limb being in the least disturbed.

But if spreading gangrene should be the consequence, it is a satisfaction to know that all was done that the art of surgery could afford; and that it was impossible to guard against the danger.

These preliminaries being determined, the surgeon acts with confidence, and the parties are previously acquainted with the grounds of their expectations.

The other instance was a compound fracture of the tibia with considerable contusion, to which the consequent inflammation and tension bore an adequate proportion. The increased action of the constitution was also

also very great, so much so, that I was induced to take away ten ounces of blood on the second day, and repeated this evacuation on the day following. I do not remember an instance where I have met with an equal degree of constitutional disease, but the blood had not the least appearance of fize.

It is now near twenty years since this case happened, and as the fever was so great and the blood not fizy, this was the first instance that induced me to form the opinion, which I think has been satisfactorily confirmed by subsequent experience, that this species of inflammation does not produce fizy blood.

Now in these two cases I should be glad to know what the solicitous hand of surgery could have done for the purpose of preventing the consequences that took place. It is my opinion, reasoning at this distant period, when both the patients and their friends all lie silent in their graves, when the only object that I can have in view is to obtain and communicate information, that it was impossible to guard against the danger; and I ask the public at large, to whose tribunal I now appeal, whether the art of surgery could provide an adequate remedy for this formidable disease?

Would disturbing the fractured limb or removing the bandages be of any use, would the renewal of dressings be productive of salutary effects, or would scalding the wounded parts with hot flupes and digestive ointments mixed with turpentine have prevented the fatal consequences? Or, on the contrary, would not the disturbing of the limb, the inquisitorial power of chirurgical oppression, the admission of external air, the additional

onal stimulus of fresh dressings, and the inevitable pain that all this business must occasion, with certainty increase the danger without the most distant probability of advantage?

I have taken this review of the treatment of compound fracture, for the purpose of examining some of the most formidable combinations of the effects of external injury. But, in cases of gun-shot wounds, in addition to violent contusion, laceration and fracture, it frequently happens that the wounded parts are filled with extraneous substances. Much has been said by former writers on this subject, respecting the necessity of these extraneous substances being removed; and when it can be done with ease and safety, it should certainly be considered the first object of chirurgical attention. But when the state of the injured parts is such, that the operation of extraction is liable to be attended with either difficulty, or danger, it will certainly be right to examine the probability of success, and consider whether the advantages resulting from the removal of those extraneous substances will preponderate against the danger of the operation.

In cases of gun-shot wounds the extraction of the ball seems to be the first object of public attention; whereas it is a question of much more importance to determine the extent of the injury, to ascertain what parts are wounded, and in what degree these parts are necessary to life. If the wounded parts are become inflamed, every attempt to extract the ball will much increase the danger, in consequence of which the successful termination will in a great measure depend on the distance of time subsequent to the period when the accident took place. And I consider this a subject of such delicacy, that every time the dressings are removed, and the

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wounded parts disturbed for the purpose of making any additional attempts for the extraction of the ball, the danger must with certainty be considerably increased.

If then, in addition to the unfriendly influence of external air, the parts are first to be examined by the probe, and then repeated attempts made by the forceps for the purpose of extraction, if the powers of nature were in the first instance superior to the destructive influence of disease, such accumulated injury must frequently become the cause of inevitable mortification. And I am well convinced that it frequently happens, that more mischief is done by violent attempts to extract the ball, than by the original injury. But if the injury is only a few degrees inferior to the salutary powers of nature, an addition that would otherwise be inconsiderable may determine the fate of the patient.

By way of illustration, let us estimate the powers of health at twenty; and, in opposition, let us suppose the influence of the injury at fourteen, the admission of external air at one, the effects of probing at two, the injury done by the forceps at three, the balance will then stand equal; but if we take into the account the agitation of the patient's mind, with the stimulus of fresh dressings, and many other circumstances that are inseparable from this operation, we shall find that this single attempt, in addition to the original injury, will with certainty determine the fate of the patient. For my own part I must acknowledge, that it is a subject which I should treat with the greatest caution; and where the life of one person and perhaps the happiness of another depended on the event, I should think it would prove an inexpressible satisfaction to all the parties concerned,

ed, to know that the injury was not increased by any irrational attempts to guard against the danger.

When all the extraneous substances can be removed with safety, the injury is then reduced to a more simple state, and the first cause no longer remains an object of our consideration. On this occasion it must be obvious to every rational mind, that it would be impossible to anticipate all the difficulties that are liable to occur in such cases, or to give directions for the endless variety of circumstances that may present themselves; it is a method that is inadequate to the subject, and must ever be found inapplicable in practice.

It is only in the voluminous pages of empiricism, that those who cannot think for themselves are to look for precedents. It is the business of science to teach mankind to think, and not to render the mind inactive by furnishing them with a long catalogue of thoughts, or imposing implicit submission to the dictates of their predecessors.

Free agency is one of the most sublime attributes of the human mind; and if it was possible to prescribe a system of directions applicable to all the vast variety of circumstances that might occur, it would be an insult on the dignity of our nature as rational beings, that such a work should be offered to the public. It would be degrading the human understanding to an humble level with the operations of mechanic powers, and making man a mere machine. It would prove an insuperable impediment to the exertions of ingenuity, it would put a final period to the progress of improvement, and for ever suspend all the active powers of the human mind.

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In the frontispiece to the Bath Guide we meet with a representation of Dame Folly leading her votaries by the nose; it is only to that part of the community who have inclination and ability to think for themselves, that I wish to appeal, and if those of a contrary description are determined to enlist under her banners, I shall not presume to oppose their inclinations.

SECTION



## S E C T I O N X.

### THE MEDICINAL TREATMENT OF THOSE DISEASES WHICH ARE THE IMMEDIATE CONSEQUENCE OF EXTERNAL INJURY, ILLUSTRATED BY THE PHENOMENA OF ANALAGOUS DISEASE.

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THE effects of bleeding have already been examined; and it has been particularly mentioned that this remedy is supposed to be most efficacious in such cases as are productive of a phlogistic diathesis of the system. I have examined many opinions on this subject, but cannot meet with any that appear satisfactory; the respective writers seem to have had no settled motive for their conduct, and to have formed their opinion without any rational basis for it to rest upon.

Mr. Christie, an army surgeon, who seems to have paid great attention to the duties of his profession, observes that in gun-shot wounds the lancet may be used with the greatest freedom. Mr. Blizard, whose book was published in the year one thousand seven hundred and ninety-eight, recommends bleeding, but expresses himself with considerable caution, and seems to prefer topical bleeding by leeches, as if he considered it the most insignificant, and consequently least objectionable. But both mention bleed-

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ing and opium, as if there was not a question respecting the propriety of their use in the same disease. Mr. Blizard says, "During the first stage, the violence of symptoms of irritation and inflammation is to be moderated by bleeding, purging, and small doses of antimony, opium, diluting draughts of watery drinks, &c. *Bleeding* should, however, be allowed with the strictest regard to the pulse, as expressive of the strength of the body. It may be copious at first, especially from the divided vessels themselves; but it should be repeated rather in moderate quantities than largely. Topical bleeding, by leeches, will prove more immediately beneficial than by the lancet, and less weakening in its remote effects \*."

This we find is giving us a matter of opinion without bringing forwards any arguments in support of it; and when we compare the two opinions we shall find that neither of them had any criterion by which to regulate their conduct. Mr. Christie who wrote from Holland says, "In gun-shot wounds it rarely fails that a considerable degree of febrile action commences, and I know no instance wherein the free use of the lancet affords greater relief; though the intestines are also to be kept open, purging, for obvious reasons, cannot well be fully employed. Opiates, in full doses, must also occasionally be had recourse to †."

It must be evident to every one, capable of forming an opinion, that the directions are all given in general terms; but they are objects of great importance in the practice of surgery, and highly merit our attention.

\* Blizard's Lectures on the situation of the blood-vessels and the nature of gun-shot wounds, edition third, page 55.

† Medical and Physical Journal, vol. 3, page 143.

If the patient is in a plethoric state, once bleeding may be made use of with safety, but I do not consider bleeding a proper remedy except in such diseases as produce a fizy state of the blood; and I am of opinion that no degree of inflammation, that is produced by means of external injury on the extremities, ever becomes the cause of that effect; so that I shall in the present instance give it as my decided opinion, that repeated bleeding would be improper. In the books that I have consulted on this subject, instead of meeting with any intelligible opinion, we are more frequently embarrassed by a catalogue of remedies that are promiscuously assembled together without any principle to direct our choice. Whether the opinion I have already given is right or wrong, is not the question in the present instance; what I contend for is, that I have at least an imaginary basis on which to rest my argument.

If then bleeding is only an efficacious remedy in those diseases that produce fizy blood, and if the disease now in question does not produce fizy blood, my inference is well founded; to oppose my opinion you must disprove the facts. I am not so presumptuous as to think myself infallible; but, as such has been the result of my enquiries, I shall endeavour under one general principle to point out such a system of practice as appears to me most rational on this occasion. Opium is mentioned in the catalogue of remedies, and it certainly is a medicine of considerable importance, but at present we are not in possession of any principle on which to rest our opinion.

If this was a truly phlogistic disease and productive of fizy blood, I should think opium an improper medicine, as much so as it would be in phrenitis,



phrenitis, peripneumonia, enteritis, erysipelas, or acute rheumatism. But as I am of opinion that this disease is not productive of fizy blood, and consequently is not a phlogistic disease, opium may be given with the greatest safety and advantage. It will abate irritation, diminish pain, prove an antidote for this species of fever, and procure repose; and in addition to all these instances of salutary influence, it will act as a cordial to support the vital powers, and consequently serve as a powerful remedy against the danger of approaching mortification. The same principles, that forbid the use of the lancet, will establish the salutary influence of opium, and vice versa.

It must appear evident from the preceding observations, that the disease which takes place in the system in consequence of external injuries to the extremities is a particular species of fever, and not a truly inflammatory disease.

The other remedies, which the materia medica furnishes us with, are saline medicines, antimonials, and purgatives. It is certainly an object of great importance in most instances of fever to clear the first passages, and on many occasions it is highly necessary to procure a plentiful discharge by means of purgative medicines. But in cases of compound fractures of the lower extremities, the operation of purgative medicines must be attended with considerable inconveniences, and consequently, if not strongly indicated, should be used with caution. It may be necessary in such cases to guard against costiveness, and for this purpose just to keep the bowels in an open state, but we should be careful not to carry this part of the treatment one degree further than what the particular circumstances of the disease may absolutely require.

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As opium may be given with great freedom in such cases, if it is united with antimonials it may protect the stomach against their nauseating influence, and jointly procure a discharge by the skin. The neutral saline medicines diluted with some of the simple waters will form a proper vehicle, and serve to diminish this species of fever without reducing the strength of the system. And as the copious evacuations by the lancet would be highly prejudicial, and the free use of purgative medicines would be particularly inconvenient; if the fever runs high and the heat of the body considerably increased, in such cases it may be prudent to abstain from the use of opium, and large doses of nitre may be given with considerable advantage.

The object on these occasions is to destroy the morbid action, without reducing the strength of the constitution; and if by these means the fever is diminished and the morbid action begins to subside, the very first instance that the approaching crisis becomes perceptible, the bark should not be neglected for a single hour. It is a period of the disease that demands the most accurate attention, and on the management of which the life of the patient will frequently depend. It has already been sufficiently proved, that the books of surgery do not furnish us with any settled plan respecting the use of the bark in mortifications, but that it has been indiscriminately given in every period of the preceding disease. I am well convinced that it is a very difficult matter to ascertain the properties of some medicines; but the powers of the bark appear too strongly marked to remain a question of doubt or uncertainty.

In a phlogistic disease, such as produces fizy blood, the bark is inadmis-

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fible, and a very few doses will seldom fail to aggravate the symptoms; but I have already observed that the fever, which is the consequence of external injury to the extremities, is not of the phlogistic kind, it does not produce a fizy state of the blood; and even here the bark, if given too early, in my opinion would be productive of bad effects. It is a medicine that gives energy and increases the action of the system, and consequently must be improper in such cases where the action is already increased by disease.

I am ready to acknowledge that the operations of the animal œconomy are in many respects obscure, that it is difficult in the first instance to obtain a critical knowledge of the facts that belong to the subjects which we wish to investigate; that our ideas at best must be imperfect, and the language in which we attempt to communicate our opinions must of necessity sometimes prove inaccurate and imperfect. I know it is a subject that in many instances exceeds the limits of the human understanding, and it will be necessary in all inquiries into the works of nature to distinguish what is beyond the reach of human reason from that which evidently appears irrational: "It being impossible for Reason ever to procure any Assent to that, which to itself appears unreasonable \*."

These observations are equally applicable to every species of philosophical discussion, but in the science of physic and surgery they have met with the least attention; the order in this instance seems to have been reversed, the subject has been supposed to be circumscribed within a little compass, and the powers of the human mind to know no bounds. But if these philosophers had either read the description of the human mind above re-

\* Locke on the human understanding, vol. 2, page 313.



ferred to, or had ever examined the narrow limits of their own, and if, previous to their enquiries into the intricate works of nature, they had only referred to the title page, and noticed the instructive motto \* which this sagacious writer has made choice of, both sides of the question would then have appeared to them in a more clear and intelligible point of view.

The species of fever, in which the powers of the bark are so particularly conspicuous, is the intermittent; but even, in this instance, the invariable object has been to give the bark during the intermission for the purpose of preventing a return. For my own part, I am of opinion that there are very few instances where the bark may be given during the active stage of fever with safety and advantage.

In those fevers which are called putrid the bark may be supposed to be most admissible; but in cases of general petechiæ I have frequently met with instances where the bark evidently increased the disease. I have heard some of my professional friends, for whose abilities I have the highest veneration and respect, not only recommend a mixed treatment, but I have seen it put in practice; yet I cannot say I ever met with any evidence to convince me of the propriety of such conduct. The question in my mind is, to determine whether the bark is proper or improper; I cannot consider it a matter of indifference in any instance of disease. But it sometimes happens that fevers of the putrid kind come to a speedy crisis, the first period soon terminates, and in such cases the bark may be given in a few days after the commencement; whereas on the contrary I

\* ECCLES. XI. 5. "As thou knowest not what is the way of the Spirit, nor how the bones do grow in the womb of her that is with child: Even so thou knowest not the works of God, who maketh all things."

have

have also seen fevers of the putrid kind run on for a month; and though I have repeatedly on every little abatement of disease tried the bark, still it has produced an increase of fever, in consequence of which the bark has been discontinued, and the cure has been accomplished without it.

It frequently happens that epidemic fevers assume a particular character, in consequence of which they may be considered provincial, in which some local circumstances give a wonderful uniformity of disease, and it may sometimes happen on these occasions that a uniformity of treatment is admissible.

I have heard of all kinds of fevers being cured by wine, and we sometimes read of instances of the bark being indiscriminately given to a whole neighbourhood with invariable success\*; and if in such instances of gene-

\* "The angina maligna, or gangrenosa, as Dr. Mead calls it, has been rife in this city, and many parts of the country, but no where so much as at Kidderminster, where it has been in a manner epidemical. Upon its first appearance in that town, nine or ten poor persons died of it successively: at last I was called to the child of one Mr. Wallis, a considerable tradesman in that place. He soon recovered by our method; and, since that time, very great numbers there have had the distemper, and scarce any have failed who sought for help before the disease had taken too deep root. For in this, if in any case, the old rule is to be observed, *Principiis obsta*, &c.

"Mr. Cooper, an apothecary of that town, a very sensible and careful man, observing the method in which the child last mentioned was treated, applied it afterwards to those persons who consulted him; and, as he had a principal share in the business of the town, he had frequent opportunities of experiencing its efficacy. He told me sometime afterwards, that instead of preparing the medicines in small quantities, according to my prescription, he had been obliged to make up several gallons at a time: so numerous were the sick, and so little variation was it necessary to make in the composition of the remedy. Upon a careful examination of his books, it appears, that since I visited master Wallis, 242 persons have been his patients for this disease, who were all treated in the manner hereafter related, and not more than seven died; of which number he mentions no more than one, who took the medicines regularly, and in good time; to the others he was not called in till the disease had made a considerable progress." Ulcerated sore throat by Dr. Wall. *Medical Museum*, v. 1, p. 114.

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ral disease the public at large cannot have the critical attention of the faculty, a general plan of treatment may be made use of with propriety, and sometimes with advantage. But I cannot say that I have met with many instances, where I had an opportunity of paying a critical attention to the progress of the disease in a multiplicity of cases, in which a variety of occurrences have not required a variety of treatment.

When such numbers of people are said to be so easily cured, it is reasonable to conclude that the doctor must possess great abilities, and the medicines irresistible powers. But as I have not been so fortunate as to be equally successful, and as every age ought certainly to profit by the examples of its predecessors, we must of necessity acknowledge either that the diseases have lost their compliability, the medicines their powers, or that the facts were not accurately stated; I suspect the latter; and if great numbers took the same medicine and great numbers were so fortunate as to recover, it is most probable that very few were dangerously ill. I have heard of apothecaries who have been accustomed always to keep the bark pot boiling; but this is a subject that belongs to the commercial part of the profession, and on the present occasion it will be necessary to distinguish between the practice of physic and the science of medicine.

I have given the bark in putrid diseases with evidently good effects, and have afterwards known the fever to increase till the bark was inadmissible; under such circumstances the plan of treatment has been varied for a few days, and the bark afterwards given with strongly marked advantage; but I have never yet met with an instance where bark and wine, as some have represented, would be given with success.



A patient of mine was some years ago taken ill in town of a putrid fever, and was attended by two physicians; one of whom stands very high in his profession, and has deservedly an ample share of public esteem; the other is in considerable practice, and I have heard him spoken of with the greatest respect. I mention these circumstances to shew that, under the direction of such eminent abilities, this young lady who was then about nineteen years of age took two bottles of port a day for a fortnight, and in addition to this had seven blisters, and a sinapism to each foot. I do not presume to say that the method of treatment was improper; the patient recovered, and all the parties were highly gratified; I only say that I never met with a similar instance in my own practice, and I never yet have had an opportunity of giving half the quantity of wine, or ever yet had occasion to make use of half the quantity of blisters.

On the subject of putrid fevers we meet with a variety of opinions respecting the use of the bark; some contend that it should be given from the first commencement through the whole progress of the disease, whilst others are of opinion that it is necessary that the fever should be abated before the bark is made use of.

Now in both instances it may have happened that each party may have formed a proper judgment of the evidence that came before them; but at the same time it is to be remembered, that the nature and symptoms of the disease may vary in different instances, and each respective variety require a different mode of treatment, according to the particular circumstances.

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But the disease in question, which is the consequence of external injury, has no variety in kind, it can only vary in degree.

I do not pretend to determine at what distance of time from the period when the accident first took place, the bark may be given in cases of external injury of the extremities; it is the state of the disease, and not the time of its duration, that is to determine the point in question. If the free use of the lancet, which some have recommended, can ever be thought necessary for the purpose of correcting the increased action of the system, bark in this state of the disease must certainly be improper. But at that very instant when the increased action begins to diminish and the fever to subside, at that critical period not a moment should be lost, and bark then becomes a most important remedy.

At the same time that it will be necessary to watch the progress of the disease with the most cautious attention, as the fever may subside in some instances sooner than in others, and as in some cases it may be difficult to ascertain the time when this critical period does take place, it is certainly an object worthy of our consideration to determine whether the bark may be given with safety before the crisis of the fever does take place, as it certainly would be right to meet that hazard which is attended with the least danger on this occasion.

I do not mean to compromise the matter with those who advise the use of the bark at the commencement, or in an early period of the disease, for the purpose of preventing mortification; I only wish to recommend a cautious line of conduct and to guard against a practical error of an  
opposite

opposite nature that might prove equally prejudicial. I do not think this is a question that admits of compromise in principle; but as it is impossible to regulate our practice with scientific certainty, I only wish to introduce this observation for the purpose of guarding as much as possible against an imperfection that is, in some degree, unavoidable.

I do not suppose that any one will contend that the fever immediately changes from the highest degree of morbid action to the lowest degree of putrid debility. But I think it is evident that the declension is by degrees, and that there is a regular decrease of action from the acme of fever to the commencement of putrid diathesis. But whatever may be the rapidity of the declension, no truth can be more evident than that the change must take place before it can become perceptible. Now as it is in my opinion, an object of great importance that the energy of the constitution should be supported at this critical period, and as in practice it will be impossible exactly to mark the change; I should by the bed side advise that the bark should rather be given a few hours too soon than one too late.

It may be here recollected that I have before observed, that the fever, which is the consequence of external injury to the extremities, is not a phlogistic disease; and this is a circumstance which in the present instance particularly merits our attention; for though I think the bark should be given with great caution in all cases of fever, yet I am of opinion there is no instance which forbids the use of the bark so powerfully as a true inflammatory disease. And if that which is the subject of our present consideration had been of this kind, it would have been necessary that a perfect solution of the disease should have taken place before it was proper that the bark should be administered.

But



But as this is not a phlogistic disease, I am of opinion that less caution is necessary; whereas on the opposite side of the question, in cases of erysipelas, which do sometimes end in mortification, if the bark was given before the inflammatory symptoms had subsided, it might be productive of the most important consequences.

But in the present instance we have not this difficulty to contend with; in all cases of external injury that do not terminate in mortification, it is reasonable to suppose that a salutary suppuration takes place at the crisis of the fever, which marks the solution of the disease. And it also frequently happens that, although this crisis may be salutary in the first instance, if bark and cordials are not soon administered the whole system may in a short time sink into a state of debility, from which it may not again be easily restored.

But in those cases that terminate in mortification, it appears more than probable to me that when the fever begins to subside, instead of a salutary suppuration, a sanious discharge takes place in consequence of the excess of previous fever, and the exhausted state of the system; that if the powers of nature are sufficient to support the constitution, the disease is then limited to the parts; but if the powers of the constitution are in a sinking state, and the administration of bark and cordials is delayed at this period, under these circumstances I am inclined to suspect that this morbid discharge is at that critical period taken up by the absorbents and conveyed into the system, in consequence of which a putrid diathesis is established, and a spreading gangrene takes place in the injured part, which, in consequence of the putrid diathesis, is with morbid rapidity communicated to the whole system.

In this accumulated state of disease I am apprehensive that the best regulated plan of practice will in general not succeed; and it appears to me to be a degree of disease, against which all the powers of medicine will be opposed in vain.

If this is what Mr. Sharp terms a spreading gangrene, it is not probable that the bark should prove an efficacious remedy; though I have no doubt of its salutary influence at a more early period and in a less degree of disease. But if the bark will not succeed, I should not place the least confidence in other cordials; on this part of the subject I cannot subscribe to Mr. Sharp's opinion, and have no doubt but the bark is the most powerful cordial that can be made use of on this occasion. But if we compare Mr. Sharp's practical observations with the above theoretical analysis of the disease, we shall find that, when the disease stops spontaneously, as he has observed does frequently happen, the degree of disease is one short of the last I have here described; and if I agree with him that the bark does not possess the powers of stopping the progress of spreading gangrene, I have no doubt but it will frequently prevent the spreading gangrene taking place, if it is given in sufficient quantity at the critical commencement of the local affection.

With respect to the quantity of bark that may be thought necessary on such occasions, it will be difficult to give a general opinion. In different instances it will vary according to circumstances, and must at last be considered a discretionary business.

In those cases, where I have thought the bark most successful, I think  
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the salutary influence did not so much depend upon the quantity that was taken in a given time, as it did on the critical period when it was first made use of. Mr. Pott and Mr. I. Hunter both speak of giving the bark in large quantities, and as long as the patient's stomach would bear it; but I am of opinion that more depends upon the time than the quantity; and if the absorption of putrid sanies once takes place, there will be the greatest reason to be apprehensive that it will not be in the power of the bark to counteract its influence.

But, when a case becomes so truly desperate, every experiment must be considered justifiable; and as our knowledge of the subject will be at best imperfect, and as there is always a possibility of forming an inaccurate or erroneous opinion, it certainly would be highly criminal for the surgeon to betray his trust, and leave the patient to his fate, by deserting his post in a paroxysm of despair. It frequently happens that nature will make exertions that we cannot foresee, for which reason it is necessary that we should always stand prepared to give our utmost assistance; and as bark and cordials are the only internal remedies which we have to fly to, it is certainly right in such cases that they should be tried to their full extent. It is our duty on such occasions to be upon the watch, and have all the powers of medicine ready to bring into action as circumstances may occur, or the particular exigencies of such dangerous situations may require.

If we may depend upon the observations of Sir George Baker, we should be induced to believe that the bark was a certain remedy in cases of mortification, much more so than in intermittent fever; as the uniformity of success in the former instance is urged as an unquestionable proof  
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of the genuine purity of the medicine. But it was rather unfortunate that the evidence did not come under his own inspection ; and I am somewhat astonished to find such a want of caution on the one hand, and excess of credulity on the other.

The evidence of experience must have convinced every attentive observer, that there are degrees of mortification which would either stop spontaneously, or without much difficulty would admit of cure. But it is a melancholy truth, too plain to be for a moment questioned, that there are also degrees of this formidable disease, which, in every part of their progress, set all the powers of medicine at defiance.

Sir George Baker observes, "That the bark of the Hospitals was not at that time deficient in some of those properties for which it has been celebrated. Doctor Reynolds had a certain proof in several instances of gangrenes which were stopped by the quantities of it usually given on such occasions\*." This is not only speaking of the bark as a certain remedy in this disease, but it is asserting that there is a line of practice established for the regulation of our conduct in such cases.

If Sir George Baker and Doctor Reynolds are right, I am wrong; for I know of no settled plan of practice, nor am I acquainted with any evidence, either written or traditional, by which I can form any rational conjecture what are the quantities of the bark usually given on such occasions.

\* Medical Transactions, vol. 3, page 153.

I was early led to believe that this was a disease so easily to be cured, that I supposed the remedies were in every surgeon's hands; and if I had never had the satisfaction of visiting the metropolis, it is probable that I should have attributed the general want of success, and frequent instances of mortality in such cases, to the very humble, low, and much inferior state of country practice. But my mind is perfectly at ease; and though I may sometimes be so unfortunate as to lose a patient, yet I must acknowledge that I do not experience the least remorse of conscience for not having sent to London for advice.

I shall not attempt to give a tedious description of the immature experience of my youth; but when I went to the hospitals, I certainly had formed such flattering expectations as the subsequent observations of Sir George Baker and Doctor Reynolds might at the present time induce the inexperienced to hope for. But I shall not attempt to describe all that I saw in town, as I have no doubt but one example will give ample satisfaction to all parties.

The case was a laceration of the ankle joint that nearly separated the leg and foot asunder; the patient fell to the care of the senior surgeon of Saint Thomas's hospital; the integument and capsular ligament were anteriorly and laterally completely divided, and the flexor-tendons also torn in two; so that the inside of the joint was completely exposed. The first view convinced the senior surgeon of the unavoidable necessity of immediate amputation, which he proposed to his patient with every expression of tender attention and humane concern that benevolence could dictate.

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But very unfortunately for all parties, just at that critical period when amputation had been determined upon by the surgeon, and consented to by the patient, another surgeon accidentally made his appearance in the ward. He was the second in standing, but looked upon himself as first in abilities. As the propriety of amputation in such cases is certainly a question of critical importance, the senior surgeon very candidly solicited his opinion; but I am sorry to recollect that the answer was not returned with the same degree of liberality with which it was solicited, or with that civility which the age and virtues of the other party, both as a man and as a surgeon, had an undoubted claim to. For with a high degree of dictatorial arrogance, which was as unnecessary as it was unjustifiable, he gave an hasty and unqualified opinion against the propriety of amputation, and directed the whole plan of subsequent treatment with the most confident assurance of success.

But, notwithstanding all the supposed superiority of his professional abilities, mortification took place in a few days, and the ward in which the patient lay was plentifully fumigated with the fragrant odours of such hot fomentations, with which surgeons in general amuse themselves and the parties during that short and melancholy period between the commencement of mortification and the death of the patient.

I must acknowledge that this case made a strong impression on my mind; and perhaps all the time I might experience a considerable satisfaction on the presumptive inference that the want of success, which I had before experienced, did not depend on the inferiority of country practice. But on the other hand, having formed high expectations of the information that

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I was to receive in town, the fair prospect immediately began to cloud, and I became apprehensive that I should not meet with any certainly efficacious method of preventing mortification.

But perhaps the quantity of bark usually given on such occasions with success was not then ascertained, as this case happened two or three years previous to the date of Doctor Reynolds's observations.

There is one circumstance worthy of attention on this occasion, that the case before us is very similar to that described by Sir James Earle, in which he first succeeded in his new method of treating compound fractures and luxations; and it may also be proper to observe that, though this case was in some respects favourable for amputation after the commencement of mortification, yet so well were they all convinced of the inefficacy of such practice that the proposal was never mentioned.

The difference between external and internal mortifications is so great, that in a practical view there seems to be very little resemblance except in name. In all cases of visceral mortification, as the parts are essential to life, their destruction must be productive of more speedy death; for which reason it must be obvious that in such instances the object is to prevent the disease taking place, and not either the curing of mortification when it has taken place, or even the stopping of its progress.

If we compare the respective indications, we shall find in the former instance that bleeding is seldom necessary and purging is to be used with caution, but opium is admissible in every period of the disease, and bark  
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is an important remedy. Whereas, in cases of internal inflammation, bleeding and purging may be made use of with unlimited freedom, at the same time that opium would be poison, and bark a useless medicine. But as we meet with a variety of circumstances that will require a variety in the method of treatment, I shall endeavour to point out the particular application of the respective remedies.

It would here be worthy of our attention to observe, that, in cases of inflammation of the integuments and muscles of the abdomen in consequence of external injury, the disease is not productive of fizy blood. But if the peritonæum or its contents become inflamed from the same external cause, then the blood becomes fizy and a phlogistic diathesis is the consequence.

In the first instance once or twice bleeding will be the full extent of this remedy, in the latter I know of no bounds to the use of the lancet.

I well recollect an instance of a gentleman whose horse going full speed passed under the bow of a tree, which struck him over the middle of the abdomen, the pain which the stroke occasioned was very considerable and continued for more than two days, the inflammation of the external parts of the abdomen was extensive, and the tension great both in degree and extent; he was once bled, but the blood was not in the least marked with size, and plentiful purging was made use of. The effects of the contusion, though extensive, were confined to the external parts, and the viscera were not affected. Fomentation and the warm bath seemed to give the most immediate relief, and the internal remedies appeared to act only as aux-

auxiliaries, as there was not any great degree of constitutional disease; and consequently the unloading of the system by bleeding and purging was more a matter of prudence than necessity. But as fomentations and the warm bath were evidently the most efficacious remedies employed on this occasion, this will perhaps prove a convenient opportunity of explaining their operation and mode of acting.

When the injury is external and limited to the integuments and muscles of the abdomen, these applications will have similar effects as in cases of contusions of the integuments and muscles of other parts; but the most important question will be whether the viscera do, or do not, partake of the effects of the injury. It has been before observed on the authority of Doctor Parr \* "that the warm bath at one hundred and six affected the head and that a vertigo and confusion came on in five minutes."

Now on this occasion I am disposed to suspect, that, when the heat of the bath exceeds that of the blood, in the first instance the blood is expanded in a greater degree than the vessels that contain it; and as the animal fluids occupy a greater space when heated, in a manner somewhat similar to the expansion of mercury and other fluids in the thermometer, a temporary plethora is in consequence produced, and a larger quantity sent to the brain: or in other words the pressure on the vessels of the brain is increased, which produces the effects abovementioned.

I do not here intend to assert that the expansion of the blood in the animal body is perfectly analogous to the operation of the thermometer, or

\* Medical Commentaries, vol 1, page 300.



do I wish it to be understood, that I am of opinion, that it is possible to explain the operations of animal life alone on mechanical principles, I only mention one as an illustration of the other.

But if a certain degree of heat affects the head and brings on delirium and fainting, let whatever may be the cause or mode of operating, the fact should teach us to distinguish a hot bath from a warm one; and these circumstances evidently prove the propriety of one copious bleeding before the warm bath is made use of, even if there is no phlogistic diathesis.

But in cases of visceral inflammation when the whole system partakes of the disease, it is then that large and frequent bleedings form the most important part of the method of treatment which we have to depend upon. Purging is certainly the second object, but except it is at a very early period, or the disease is of an inferior degree, it frequently happens that purgative medicines will not operate unless the stricture has been relieved by previous bleeding. I have known instances where powerful doses of purgative medicines have been given and the bowels remain inactive, until by very copious bleeding the whole system has been set at liberty.

On such occasions I have frequently taken two pounds of blood away at a time, and I am well convinced that, when large quantities are taken, the disease is frequently destroyed with the least expence to the constitution, as two pounds taken at once will sometimes prove more efficacious than double the quantity taken at four different intervals. But it would be impossible to prescribe any certain quantity, it must depend on the effects; in such instances it will not be sufficient for a physician to prescribe

scribe the loss of ten, twelve, or sixteen ounces of blood; it is necessary that the person who gives directions should attend during the operation, as it is impossible to determine the quantity but by the effects; the prescription should rather be quantum sufficit than any limited quantity; and though I may be suspected of urging this subject with irrational enthusiasm, yet I shall beg leave to observe in reply, that in many instances it will not be sufficient to take away a small basin of blood twice a day, and at the same time give purgative medicines in small doses, but it will be necessary in every particular instance that the remedy should be proportioned to the degree of disease.

But I have known cases where I have attended at a very early period, where bleeding and purging have both been made use of to the full extent, where an uninterrupted plan of very powerful treatment has been continued for six or eight days, where the disease has for short intervals given way to the influence of medicine, and yet ultimately the inflammation has resisted all the powers of medicine and mortification been the inevitable consequence.

Emetic tartar is frequently recommended in such cases, and blisters may sometimes be made use of with great advantage; but bleeding and purging and the warm bath are the most important remedies. When emetic tartar is given in such cases it is probably with a design of abating the inflammatory fever, and acting as an auxiliary to the purgative medicines; I have never seen it given in large doses in inflammation of the bowels, but I have known some instances where it has been given in too great quantities and proved purgative in a very dangerous degree. I think its  
operation

operation in the first instance is uncertain, but when it does prove purgative it is generally in the extreme.

As this disease is in general extremely painful, it sometimes happens in the early stages that opium is inadvertently given for the purpose of easing pain, but this will frequently prove a fatal error that can never after be corrected; it appears to me to be a case in which opium is inadmissible. Opium is sometimes given with intention to correct the morbid irritability of the stomach, for the purpose of protecting the administration of purgative medicines; but it is a method of practice that I should always view with the most cautious apprehension, as this is a truly phlogistic disease productive of fizy blood, the symptoms of which are always aggravated by opium. I know of no disease in which the danger and delusion is so great as in the present instance; and instead of attempting to allay the irritability of the stomach with opium, I should certainly give the preference to copious and repeated bleeding, and warm fomentations; and it is probable that blistering might be used on this occasion with great advantage.

But cases of a mixed nature do sometimes occur in which I have found the temptation to give opium irresistible; yet, on such occasions, it is necessary for the surgeon to stand with his lancet in his hand for the purpose of guarding against the effects of its phlogistic influence.

The most difficult instances which I have met with of this kind have been in cases of diseases of the liver, where there has been unquestionable evidence of chronic indurations, and inflammation has taken place under  
such



such circumstances. If in such cases an indurated part of the liver presses on the biliary duct, it sometimes occasions an excess of pain that is almost intolerable, very similar to the effects of gall stones. In such instances, after copious bleeding and other remedies had been tried in vain, and after I had by strict attention satisfied myself respecting the nature of the disease, I have sometimes been tempted to try the effects of a large dose of opium, but cannot say that the effects have always justified the experiment.

I well remember a case of this kind, where bleeding and purging had been used in full force for some days; and though the painful symptoms were repeatedly relieved for a short time, yet twelve hours never passed without a return of excruciating pain. At one of these recurrences I happened to visit my patient, and the nature of the pain most resembled that which is occasioned by an obstruction of the biliary duct; I was tempted to try a large dose of opium. I then waited for an hour, but the pain was not in the least relieved, in consequence of which I determined to bleed with a large orifice until fainting should take place and relieve the pain; for this purpose I took away about two pounds of blood with all possible expedition, and my patient, who was a female not of a strong constitution or full habit, fainted away, by which we procured relief from a state of intolerable torture. As soon as she was so much recovered as to be able to swallow, I gave ten grains of calomel, which after a short interval was followed up with a powerful purgative of salts and manna, which with warm fomentations procured an abatement of disease. But bleeding and purging were continued for ten days or a fortnight afterwards, by which means the phlogistic diathesis was destroyed, and she has been perfectly well

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ever since. As the effects of opium would have been perceptible in an hour, it is evident it had no salutary influence in this disease; and as it would be so completely carried off by the operation of a powerful purgative, it is probable that its effects in this instance were unimportant.

I have mentioned this case to prove that I have tried the effects of opium in a phlogistic disease; and though the distress of the patient, the anxiety of the friends, and disappointed hope, may sometimes induce a person to make use of remedies that he may not altogether approve, (for it is not likely that the last efforts of despair should be regulated by the dictate of deliberate reason) yet I should consider it an act of the most irrational desperation to make use of precarious remedies, without being provided as much as possible against the dangerous consequences if the attempt should not prove successful.

What renders this subject more particularly interesting is the unqualified opinion which has been given by a modern author\* respecting the use of opium; whose works seem to be daily gaining popularity, and whose delusions spread their influence on the credulity of the world. I shall not now attempt to enter into a full discussion of all the merits of this celebrated system; but I would very seriously advise those, who have not made up their minds upon this subject; (if they should wish to try the effects of opium in a truly inflammatory disease) by all means to watch the progress of their experiments with the utmost care of apprehensive caution. In the instance, that I have already mentioned, opium did not

\* Brown's Elements of Medicine.

procure an alleviation from the painful symptoms, and consequently it was necessary to have immediate recourse to some other method. But it is probable that we have most reason to be upon our guard when opium relieves the pain; for, as in inflammatory cases it does not produce this effect by diminishing the energy of disease, it too frequently happens that the parties become lulled into a dangerous security, and in this interval the destructive progress of disease arrives at a degree over which the powers of medicine lose all their influence; and it is to be remembered that, if opium is a specific for mortifications of the toes and feet, as is represented by Mr. Pott, it is the most dangerous medicine that can be made use of in inflammation of the bowels; and if mortification does take place, then death is certain.

This is a subject which particularly merits our attention, as I am well convinced that instances too frequently occur, where the life of the patient falls a sacrifice to the error abovementioned; and if we consult some of the first writers on the practice of physic, we shall not meet with any satisfactory explanation or rational plan of treatment.

When the disease is seated in parts less necessary to life, a single dose of opium may not be productive of such inevitable danger; but in all cases of truly phlogistic disease its unfriendly influence must soon become perceptible. It is highly recommended by Doctor Brown in cases of acute rheumatism \*, and as this is an instance in which an inflammatory disease is  
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\* "Hence, sweating is remarkably adapted to the cure of this disease: To sweating, therefore, after a previous bleeding to twelve ounces, and with attention to the rule of temperature and diet before



least likely to end in speedy death, it may be considered the most justifiable subject of experimental inquiry. But it will not be necessary to torture the patient with improper remedies for the purpose of determining the point in question; the ignorance or inadvertency of mankind will furnish sufficient evidence, and prevent the unjustifiable necessity of doing what is supposed to be wrong, and by that means endangering the life of the patient, for the purpose of proving what is right. But for fear I should be accused of illiberality or want of candour for reflecting on the ignorance and inadvertency of others, I shall here beg leave to mention an instance of my own.

I was one evening called to visit a patient when I was very much limited for time, and had not an opportunity of making a minute inquiry, or of obtaining an accurate knowledge of the nature of the disease; but for the sake of expedition I accepted of the evidence without cross examination. The disease, which was supposed to be rheumatic, was situated in the arm and shoulder, and was represented as a disease of long standing. I examined the state of the pulse, and not meeting with any symptoms of increased action or striking evidence of constitutional affection, I hastily concluded that this disease was of the chronic kind, and directed a scruple of Dover's powder to be taken at going to bed. The next evening I found

fore given, we must have immediate recourse, if the diathesis happens to be considerably violent, which appears from the heat of the body, the pains raging most in the night time, and from a strong and hard pulse. In order to render the sweat universal and of sufficient duration, it should be excited by Dover's powder, or laudanum, as before hinted, and kept up for twelve hours in full flow, and then some hours longer, or till the abatement of the symptoms, in the form of moisture or free perspiration, and repeated when the symptoms return. The rest of the cure must be entrusted to low diet and an exact temperature." *Brown's Elements of Medicine, by Beddoes, vol. 2, page 168.*

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my patient highly gratified with the temporary relief that he had experienced; he had sweat profusely, the pain was abated, and he had had a good night's rest. As the parties were all so well satisfied, without any further inquiry I directed the same medicine to be repeated for two or three nights more. But on the third morning I found that the symptoms of inflammation had become conspicuous; and what, but a few days before, I hastily concluded was chronic rheumatism, I was well convinced was a true inflammatory disease.

The discharge by the skin was every night, in consequence of the Dover's powder, extremely copious, and the pain was for a time subdued by the influence of opium; from which it is evident that sweating will not cure an inflammatory disease, and in this instance the very same medicine was made use of which is recommended in the Brunonian system.

I have frequently seen Dover's powder prescribed under a variety of circumstances in cases of inflammatory disease, but cannot say that I have ever met with a single instance of its salutary influence.

In chronic diseases of the abdominal viscera it frequently happens that pains across the loins are a common symptom, and these by the patient are generally thought to be rheumatic. In cases of this kind I have repeatedly known Dover's powder to be prescribed, which for the first or second night would seldom fail to give some relief from pain; and as, in the instance that I now allude to, the warm bath was also made use of every evening previous to the taking of the Dover's powder, very copious sweating was the invariable consequence; yet notwithstanding the additional

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influence of the warm bath the symptoms daily increased, and the disease, which was at first supposed to be chronic rheumatism, was soon found to be seated in the viscera of the abdomen, and was in a few days hurried up into a high state of general inflammatory affection.

It is not with any pusillanimous intention of guarding my own professional conduct from suspicion, or for the purpose of protecting misrepresentation under a veil of obscurity, that I make this appeal to facts that may be supposed to rest on an imaginary basis. It is of no importance to the public to whose want of judgment these instances of erroneous practice are to be attributed; and if any one should in future be influenced by similar opinions, I flatter myself that more attentive observation will convince him of his error; for, as the evidence of nature is immutable, if these representations are a true description of the phenomena of disease, the recurrence of similar causes will always be productive of similar effects.

The acute rheumatism is a disease of increased action; and though opium united with ipecacuan may act as a powerful diaphoretic, yet as the discharge by the skin in this instance is the effect of excitation, these stimulating medicines will seldom fail to increase the disease; whereas the salutary diaphoresis, which is produced by the liberal use of bleeding and other antiphlogistic remedies, is the natural consequence of a perfect solution of the disease.

In this instance the increased action is first destroyed, and the cutaneous glands, whose powers were suspended by the superior influence of inflammation



flammation, are set at liberty to resume their former functions. By the first method, let the discharge be ever so copious, the inflammatory symptoms will not be in the least diminished, but ultimately the use of opium is certain to produce an increase of disease; and I am well convinced that in all instances of inflammation, that are attended with, or likely to be productive of, a phlogistic diathesis, let the disease in its origin be ever so obscure, if opium is given, it will seldom fail to bring the morbid powers to light.

But it is in painful diseases of the bowels where it is particularly necessary that we should be upon our guard; and as it will frequently prove a difficult question to distinguish between those diseases which are said to be spasmodic, from those that are inflammatory, the greatest caution will be necessary in the regulation of our practice. Doctor Brown asserts that cholera, the cholic, and iliac passion are all the same kind of affection, and insinuates that diarrhœa and costiveness are only different degrees of the same disease and all to be cured by opium.\*

With respect to the nature of these diseases I shall appeal to Doctor Cullen's practice of physic, and on this occasion it will not be necessary to make any observations on these great professional characters, as it is a subject with which the public are already well acquainted.

\* "The colic has been commonly treated by purging and bleeding, and low diet; but in no instance has that treatment of it been successful. Opiates were particularly forbidden upon the supposition of their constipating the belly; but the truth is, that the colic, as well as diarrhœa (which has been supposed a disease of an opposite nature, from the seeming contrariety of looseness of the belly and costiveness to each other), are the same kind of affection, only differing in degree. And the colic is to be removed by no other means than those that remove the simple looseness; that is by durable and diffusible stimulants." Brown's Elements of Medicine, vol. 1, page 188 and 189.

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This nosologist mentions colic and the iliac passion as similar in their nature, and only varying in degree, and classes them both under the arrangement of spasmodic disease: but, in addition to his general principle of spasm being the proximate cause both of fever\* and inflammation†, he also gives it as his opinion that colic, which is a spasmodic disease, frequently becomes the cause of inflammation in the bowels.

But independent of this effect, he recommends bleeding as the first antispasmodic remedy that should be made use of; and it is of no consequence, in my mind, whether bleeding is made use of as an antispasmodic or an antiphlogistic; as the phantoms of the theory of medicine will not divert its powers.

If we refer to Doctor Cullen's description of these diseases we shall meet with an inaccuracy of considerable practical importance; in the first place, colic and ilius are both said to be spasmodic diseases, but afterwards we

\* "The idea of fever, then, may be, that a spasm of the extreme vessels, however induced, proves an irritation to the heart and arteries; and that this continues till the spasm is relaxed or overcome. There are many appearances which support this opinion; and there is little doubt that a spasm does take place, which proves an irritation to the heart, and therefore may be considered as a principal part in the proximate cause of fever. It will still, however, remain a question, what is the cause of spasm; whether it be directly produced by the remote causes of fever, or if it be only a part of the operation of the *vis medicatrix naturæ*." Cullen's Practice of Physic, vol. 1, page 93.

† "From the doctrine of fever, we are led to believe, that an increased action of the heart and arteries is not supported for any length of time by any other means than a spasm affecting the extreme vessels; and that the same spasm takes place in inflammation, seems likely, because that every considerable inflammation is introduced by a cold stage, and is accompanied with that and other circumstances of pyrexia. It seems also probable, that something analogous to this occurs even in the case of those inflammations which appear less considerable, and to be purely topical." Cullen's Practice of Physic, vol 1, page 278.

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are informed that inflammation is sometimes the consequence of colic \*, and that this becomes the cause of ileus, which was before only considered as a superior degree of the same disease †; and though in the conclusion he seems undetermined in his opinion, yet as inflammation is admitted to be the effect of colic and cause of ileus, it is a subject that demands the greatest practical caution, as a single dose of opium would frequently determine the fate of the patient.

If in cases of violent pain in the bowels attended with constipation and tension of the abdomen, whatever might be the name of the disease, if in such cases opium was alone depended upon, or even if a single dose of laudanum was prescribed under such circumstances, I should not hesitate to give it as my decided opinion, that the author of such a prescription must at the time of writing be under the delusive influence of diffusible stimuli.

Doctor Heberden has long ago observed that pain will not quicken the

\* "The enteritis has likewise its own peculiar causes, as supervening upon the spasmodic colic, incarcerated hernia, and volvulus." Cullen's Practice of Physic, vol 1, page 429.

† "In these circumstances of inversion the disease has been named ileus, or the iliac passion, and this has been supposed to be a peculiar disease distinct from colic; but to me it appears that the two diseases are owing to the same proximate cause, and have the same symptoms, only in different degree.

"The colic is often without any pyrexia attending it. Sometimes, however, an inflammation comes upon the part of the intestine especially affected; and this inflammation aggravates all the symptoms of the disease, being probably what brings on the most considerable inversion of the peristaltic motion; and, as the stercoraceous vomiting is what especially distinguishes the ileus, this has been considered as always depending on an inflammation of the intestines." Cullen's Practice of Physic, vol. 4, page 20 and 21.



pulse, and mentions as an example that the excessive torture, produced by the passing of a gall stone, does not affect the arterial system\*.

But if pain without inflammation may exist and the pulse not be in the least affected, we also find that genuine inflammation attended with violent pain will frequently continue for some days and the pulse remain quiet and undisturbed; from which it is evident, that, if we depend alone on the state of the pulse, we shall often be deceived.

I have frequently met with cases of inflammation of the bowels, where the symptoms so nearly coincided with those which are said to be attendant on the spasmodic colic, that the most accurate attention was necessary for the purpose of ascertaining the real nature of the disease; and I have known instances of genuine inflammation of the bowels, in which the pulse for the first two or three days has not been in the least affected, and though in such cases repeated bleeding has been made use of during this period, yet in the early stage of the disease the blood has not in the least

\* "It is often supposed, that great pain will quicken the pulse: I am more sure, that mere pain will not always do it, than I am, that it ever will. The violent pain occasioned by a stone passing from the kidneys to the bladder is often unattended with any quickness of the pulse; and the excessive and almost intolerable torture produced by a gall stone passing through the gall ducts, never once quickened the pulse beyond its natural pace, as far as I have ever observed, though it be a disorder which occurs so very frequently: and this natural state of the pulse joined with the vehement pain about the pit of the stomach affords the most certain diagnostic of this illness. I have seen a man of patience and courage rolling upon the floor and crying out through the violence of this pain, which I was hardly able to lull into a tolerable state with nine grains of opium given within twenty-four hours, to which he had never been accustomed, and yet his pulse was all the time as perfectly quiet and natural, as it could have been in the sweetest sleep of perfect health. Medical Transactions, vol. 2, page 32..

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been marked with size. If then in such instances the uninterrupted state of the pulse and the absence of the fizy appearance of the blood were to be admitted as satisfactory evidence that the disease was not inflammatory, and opium had recourse to as an antispasmodic, the painful symptoms might be for a time suspended, and the parties lulled into a state of false security; during which interval, the disease might make such progress as to render mortification inevitable.

If any one should suspect that my opinion on this subject is in the present instance led astray by the captivating charms of theoretical enthusiasm, or suppose that I have misrepresented facts for the purpose of supporting a favorite hypothesis; I should in reply take the liberty of observing, that such scepticks had never paid any attention to the subject, or were incapable of examining the evidence of nature. But that I may safely guard against all the sarcastic sneers of infidelity, I shall mention an example, in support of which I could appeal to such professional authority as I have no doubt would prove satisfactory.

I was lately called to a young man who was under two and twenty years of age; he had a few hours before been seized with violent pain in the umbilical region, the integuments of the belly were drawn inwards and the muscles contracted with considerable tension over the inferior part of the abdomen. He was not particularly constipated, and his pulse was in an even uninterrupted state. I instantly pronounced the disease inflammatory, took away twenty ounces of blood, directed a purgative glyster to be injected as soon as possible, and immediately afterwards gave a large dose of calomel, which after two hours interval was followed with  
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a copious draught of salts and manna. He was well fomented in the evening, and the abdomen afterwards rubbed with strong volatile liniment.

The next morning I found his pulse in the same uninterrupted state; but as the pain and tension still continued, twenty ounces more blood were taken, but neither this nor the former had the least appearance of size. Purgative medicines were still continued, and in the evening he was put into a warm bath, in which he fainted; this produced a copious perspiration, and considerable relief from pain. But the symptoms returning by the next morning, and the arterial action being evidently increased, I thought necessary that he should loose twenty-four ounces more blood, which was strongly marked with size. Purgative medicines were again repeated, and as the symptoms continued nearly the same at six o'clock in the evening, we concluded to have the opinion of a Physician. He was fomented the same evening from seven o'clock till nine, in consequence of which a copious perspiration took place and the pain abated. When the Physician arrived about nine o'clock the next morning, he found all the symptoms much diminished and the patient in a recovering state; but, as the arterial action had not completely subsided, he directed a plan of gentle laxatives to be continued for a few days. My principal motive for describing this case is to introduce the concurring testimony of another person respecting the nature of the disease. If I had for three days been treating a spasmodic affection as an inflammatory disease, the Physician would certainly have changed the method of proceeding; and as the evacuating system had been already carried to considerable extent, if the disease had been spasmodic, opiates might then have been given with safety and advantage.

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If I had done wrong, I have no doubt but some method would have been taken to have convinced me of the impropriety of my conduct. For such is the impartial respect with which I have long been favoured, and such the public attention which I am proud to boast of, that I am well convinced not even my errors would have been permitted to have passed unnoticed.

The disease which takes place in cases of strangulated hernia is of the mixed kind, and may in the first instance depend on an inflammation of either the internal or external parts of the hernia; but in the latter instance, when it proceeds to mortification, it is in some respects similar to that species of disease in the extremities which is the effect of bandage, which are both frequently completely cured by the removing of the cause. In the one case the taking off the bandage may prove an immediate cure, and in the other the disease is sometimes brought to a salutary termination by the operation for the bubonocoele.

But it must be evident, in such instances of complicated disease, that the method of treatment must be varied according to the respective combination of circumstances. And there are two important objects that on this occasion particularly merit our attention; the first is, that purgative medicines will frequently not succeed, and that accumulated doses are sometimes productive of bad effects; the second is, that mortification in cases of hernia is not always fatal, as this is sometimes a partial disease and limited to the hernia and its contents; and it is in such cases where the operation for the bubonocoele would be most likely to prove efficacious, if undertaken at a proper period of the disease.

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I once had a case of umbilical hernia under my care; which for about two years previous to the fatal termination was extremely large, of uneven surface, and irreducible. In other respects the patient was in perfect health, and became very corpulent in consequence of the inability to use her accustomed exercise. As it was probable that a large portion of the intestines was contained in the hernia, it frequently happened in the last two years of her life that stricture took place attended with violent pain and obstruction in the bowels. In this case bleeding appeared to me not only the first, but the most important, remedy we had to flee to, and it is not probable that purgative medicines would procure a passage through the contents of the hernia, under such circumstances, until the stricture was first removed. One copious bleeding was in general sufficient for the purpose; and, if fainting and general relaxation were the consequence, I then found that purgative medicines seldom failed to produce the desired effect.

But the time at last arrived when neither bleeding nor purgative medicines would succeed; and, though the disease ended in mortification, still the blood did not bear the marks of inflammation. Bleeding on this occasion was made use of in large quantities without effect; and tobacco glysters were also given without any evident advantage. As the blood was not fizy, nor the system much affected in the early stage of the disease, I was apprehensive that the mortification would have been limited to the external parts, and formed a termination similar to that \* described by Mr. Chesel-

\* "The case of Margaret White, the wife of John White, a pensioner in the fishmongers almshouse at Newington in Surry. In the fiftieth year of her age, she had a rupture at her navel, which continued till her seventy-third year, when after a fit of the cholic, it mortified, and she being presently

Chefelden; but this disease ultimately communicated to the system and terminated in death.

Now as this disease appears in the first instance to have depended on stricture and was not productive of fizy blood, a question arises whether opium might not have been given after the first bleeding with some probability of success. It certainly is more admissible in cases of hernia for the purpose of allaying the irritation of the stomach than in any other species of disease that is liable to terminate in mortification of the bowels, and may at the same time contribute to relieve the stricture; but when the disease has communicated to the parts within the abdomen and a phlogistic diathesis has taken place, then opium will prove a very dangerous medicine.

I once met with a case of bubonocoele that terminated in mortification, where the disease was limited to the external parts; the whole of which sloughed away, and the faeces were discharged for some weeks through the opening, but the parts had been united by the previous inflammation, and the external wound afterwards contracted so that a perfect cicatrix was formed, the faeces afterwards took the natural course, and the person lived years afterwards in perfect health.

sently after taken with a vomiting, it burst. I went to her and found her in this condition, with about six and twenty inches and a half of the gut hanging out mortified. I took away what was mortified, and left the end of the sound gut hanging out at the navel, to which it afterwards adhered, she recovered, and lived many years after voiding the excrements through the intestine at the navel, and though the ulcer was so large, after the mortification separated, that the breadth of two guts was seen; yet they never at any time protruded out at the wound, though she was taken out of her bed, and sat up every day." *Chefelden's Anatomy*, page 324.

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Every one that is acquainted with the œconomy of animal nature will be well convinced of the possibility of such fortunate occurrences ; but he will at the same time be equally satisfied that it is not within the limits of the chirurgic art to dictate to nature in such cases, or to insure success. Mr. Pott has recommended the attempt\*, but does not mention that he was himself so fortunate as to meet with many favourable instances in his own practice. It is a business that nature sometimes may accomplish, but art must operate in vain if not protected by the most favourable concurrence of her friendly powers.

In all cases of inflammation of the intestinal tube, the administration of internal remedies demands the greatest caution ; as it frequently happens that neither medicine nor food can be retained. This is by some supposed to depend upon an inversion of the peristaltic motion of the intestines, and opiates are directed with an intention to allay the irritation, and purgatives given under the influence of the opium for the purpose of restoring the inverted motion to its natural direction.

I shall not attempt to explain the nature of what is called the peristaltic motion of the intestines, though it seems to be a subject but imperfectly understood ; it is a term that has been long made use of without any accurate signification, and the peristaltic motion of the intestines and oscillatory motion of the capillary arteries appear to me both equally unintelligible and obscure. But whatever may be the nature of that operation which conveys the aliment through the intestinal tube, it is in many

\* Pott's Treatise on Ruptures, first edition, page 139.

instances

instances so influenced by disease as to return the contents of the stomach and intestines by the mouth. In cases of hernia the mechanical obstruction that prevents the passage through the bowels is plain and self evident; but in many other instances the cause is more obscure.

Doctor Cullen observes \*, that the spasmodic constriction of a part of the intestine, in cases of spasmodic colic, is evident in dissection; but if the disease had only been spasmodic, I should have thought that all the appearances of spasm would have terminated with life, and should for that reason be induced to infer that the permanent appearances after death must be the effects of inflammation, although spasm might be the first original disease; in consequence of which we shall have the symptoms of spasmodic colic in the first instance, and the appearance of inflammation after death.

When obstruction takes place in consequence of spasmodic stricture, or in cases of hernia, if the whole disease was limited to this obstruction, then it would be probable that opiates might be given with a rational prospect of success; but as in the first instance inflammation is supposed to take place previous to the appearance of the iliac passion, and as in cases of hernia the disease is not in general limited to the parts, it is still necessary that opiates should be given with the greatest caution, and not without the most critical attention to the nature and period of the disease; as it appears evident, even from the accounts before us, that the inverted action of the stomach and bowels depends on an inflammatory affection.

\* Cullen, vol. 14. page 22.

Inflammation of the viscera may also terminate in suppuration; I remember two cases of this kind, in both of which it is probable that the peritonæum was the principal seat of the disease. One was the effects of external injury, the other the natural consequence of internal disease.

On this occasion it will be necessary to recollect Mr. J. Hunter's observations respecting the formation of matter on secreting surfaces without the loss of substance. I happened to meet with a case of empyema soon after the publication of Mr. J. Hunter's treatise on the venereal disease, and I am ready to acknowledge that the information I there met with was particularly interesting and satisfactory. I cannot suppose that a subject of such importance can have escaped the attention of the professional reader; but as these observations may fall into the hands of some who have not examined Mr. J. Hunter's works with critical attention, I shall beg leave to give a full quotation of his opinion \*.

\* Till about the year 1753, it was generally supposed, that the matter from the urethra, in a gonorrhœa, arose from an ulcer or ulcers in that passage; but from observation it was then proved that this was not the case. It may not be improper to give here a short history of the discovery that matter may be formed by inflammation without ulceration. In the winter 1749, a child was brought into the room, used for dissection, in Covent-Garden; on opening of whose thorax a large quantity of pus was found loose in the cavity, with the surface of the lungs and the pleura furred over with a more solid substance similar to coagulable lymph. On removing this from those surfaces, they were found entire. This appearance being new to Dr. Hunter, he sent to Mr. Samuel Sharp, desiring his attendance; and to him it also appeared new. Mr. Sharp, afterwards, in the year 1750, published his Critical Enquiry, in which he introduced this fact, "That matter may be formed without a breach of substance;" not mentioning whence he had derived this notion. It was ever after taught by Dr. Hunter in his lectures. We, however, find writers adopting it without quoting either Mr. Sharp or Dr. Hunter. J. Hunter on the Venereal Disease, sec. edit. page 29.

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It is a subject that appears to me particularly interesting; and I am well convinced that the successful termination of many diseases depends on this circumstance, whether there is a loss of substance, or whether the matter is formed in consequence of the inflammation of a secreting surface.

One of the cases that I am about to describe terminated favourably, the other did not; I was suspicious that in the last case the peritonæum had become ulcerated, but I had not the satisfaction of an anatomical examination. In the first instance, inflammation had taken place in the bowels, and had continued for two days before I was consulted; the pain had then become distressing, and the disease put on very formidable appearances; bleeding, purging, fomentations, and warm bath were applied in full force, and the disease at last terminated in suppuration. When the inflammation had subsided and the pain had ceased, though the patient continued in a very feeble state, my attendance was not at that time thought necessary, and the disease was left to proceed without the interruption of medicine, until the enlargement of the abdomen became perceptible and created fresh alarm.

On my second visitation I found my patient reduced in strength, very restless and uneasy; I only ventured the first day to direct an opiate draught to be taken at bed time, and this was continued for some time afterwards, and satisfied the parties until the matter made its way at the umbilicus. This occasioned fresh alarm, and I was again called upon to renew my attendance.

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I had then been in the habit of giving the digitalis in hectic cases for some years; and supposing it the only medicine that was likely to abate the discharge, I directed two grains of the powder of digitalis to be taken every night and morning, which was continued at intervals for more than two months; but whenever the stomach became affected it was then omitted for a few days, and when the nausea had subsided it was again resumed. The discharge of matter gradually diminished, and in about two months completely ceased.

The parties, from motives of œconomy, did not require regular attendance; and as I considered it a lost case, I was perhaps on that account less solicitous; I considered the case desperate, and the remedy the last resource; and when I urged the propriety of perseverance, I cannot say that I had any very sanguine expectation of success.

If I had then had more frequent opportunities of making observations, I might now be more accurate in my description; but I have nothing but the dates and prescriptions to assist my recollection, and I shall not now attempt to fill up the vacancies with conjectures. I find, by referring to my account books, that I first visited this patient on the fourth of May one thousand seven hundred and ninety-two, and that on the sixteenth of June I began to give two grains of digitalis in powder every night and morning, which appears to have been continued, with some short intervals of omission, until the last week in August, when the account terminates; and the patient, who was at that time about ten years of age, has been perfectly well ever since.

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The other case above alluded to happened about the same time; it was the effect of an accident at play, in consequence of a girl, about twelve years of age, being twisted in a rope that was used for a swing. She fainted at the time, and in a few days the contents of the abdomen became inflamed. This disease terminated in suppuration; but when the abdomen became enlarged, as I had more frequent opportunities of seeing this patient, and minutely watching the progress of the disease, and when the matter began to point at the umbilicus, I made an opening with a lancet, in consequence of which a large quantity of purulent matter was immediately discharged.

In this case every possible attention was paid to the patient through the whole progress of the disease; the digitalis was given with much more care and circumspection than in the former case, but not with the same success; the discharge continued to increase in quantity, and the patient sunk under the disease in about two months from the time when the accident first took place.

I have mentioned these two cases for the purpose of illustrating the effects of digitalis, where matter forms in any of the internal cavities; which was a species of disease but imperfectly understood previous to the date of Dr. Hunter's discovery. It certainly would have been a great satisfaction, on this occasion, to have had it in my power to describe the state of the parts of the unsuccessful instance after death; as I think it is probable that the success in such cases depends on an absence of ulceration. In successful cases the state of the parts cannot be known; but if after death the parts are in general found ulcerated, it would furnish very strong presumptive evidence in favour of this opinion.



The digitalis purpurea has by some few ingenious men been introduced into the practice of physic during the last twenty years; but it now seems to be making its way into general practice, and will probably soon become one of the most popular agents in the whole materia medica. But as the public opinion seems at present in an unsettled state, and the facts that we are already in possession of unconnected; I shall not attempt to examine what has been said by others, but endeavour to describe my own experience on this subject.

The first time that I ever gave the fox-glove with success, was on the seventeenth of July one thousand seven hundred and eighty-seven; this case appeared to me at that time particularly interesting and instructive, as there was an uncommon combination of circumstances to which this medicine seemed to prove a general antidote. The subject was a married woman, between twenty and thirty years of age, who had long been of a leucophlegmatic constitution, and had for some time had strongly marked symptoms of phthisis, such as hectic fever, cough, and very purulent expectoration, and in addition to these formidable symptoms were added great debility and general anasarca, the latter of which was most probably dependent on the state of the constitution previous to the commencement of the pulmonic disease.

On my first visit I found her respiration so distressingly laborious that I was also suspicious of a hydrops pectoris; but sometimes it will be difficult to distinguish between a hydrops pectoris and anasarca pulmonum. And as the cellular membrane in all the external parts of the body appeared loaded with serum, it is probable that the lungs in this instance would  
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partake of the general disease. On this occasion the digitalis appeared to me to be the only medicine likely to give relief under this complicated concurrence of disease. I gave five grains of the powder of the leaves of fox-glove that evening; I gave two doses, of the same quantity in each dose, the next day; fifteen grains were given on the third day; and on the fourth day, thinking necessary to diminish the dose, I only gave twelve grains. On the second night the dyspnœa began to abate, and she could lie down in bed, which she had not been accustomed to do for some time past; by the third evening the distressing symptoms had completely disappeared, and by the next morning the stomach became considerably affected, in consequence of which the quantity of digitalis was diminished from fifteen grains to twelve. On the fifth day the sickness was become constant and very distressing; but the dyspnœa had subsided, the expectoration disappeared, and the cough ceased; the disease seemed to be completely conquered, and the effects of the medicine constituted every difficulty that remained.

Such a concurrence of favourable circumstances was certainly highly gratifying to all parties, particularly to myself, as this was my first successful essay. But one additional occurrence particularly merits our attention. On the fifth day she observed to me that for some time past she had an issue in her arm, which at that time ceased to discharge. I gave her a digestive ointment with cantharides to anoint the pea with, but it did not succeed; and I was in a few days convinced that the same power of the digitalis, which had suspended the purulent expectoration, had also prevented the discharge from the issue. But this is not the only instance  
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which I have met with, and I have had repeated opportunities since that time of noticing similar evidence of the effects of the digitalis.

The manner in which the digitalis gives relief in dropical cases, is supposed to be by promoting the absorption of the serous effusion; and the vox populi in common use on this occasion seems to sanction this opinion. But if we examine the subject with critical attention, we shall perhaps hesitate before we presume to determine whether the effects of the digitalis depend upon the increased action of the absorbent system, or a diminution of secretion. I should be sorry to insult the anatomical reader with a repetition of those arguments which have so frequently been made use of for the purpose of explaining the accumulation of serous effusion in the different cavities; but it must be obvious to those, who are acquainted with the operations of the animal œconomy, that the deficiency or excess of the secreted fluids will depend on the proportions that exist between the secreting and absorbent actions.

The effects of the digitalis on the animal powers are to induce debility. It suspends the action of the digestive organs, diminishes the powers of the circulation, and reduces the velocity of the pulse; it relaxes the energy of the nervous system, and if given to excess will put a final stop to all the powers of the animal machine. If then the digitalis diminishes the animal powers in every instance in which we have an opportunity of observing its mode of action, it will certainly be reasonable to conclude, that, when the morbid accumulation is abated by the remedy, it must be by diminishing the action of the organs of secretion, and not by stimulating



stimulating the absorbents into action; as its properties are to diminish animal actions and not increase them. In the hydrothorax, in which the powers of the digitalis are most certainly efficacious, it is of no importance, in a practical view, whether the remedy operates by increasing absorption, or diminishing secretion; the object is to remove the accumulation of that serous fluid, which is secreted by the glands of the pleura.

The difficulties of ascertaining the powers of any medicine are so great, that it betrays the most irrational presumption for any one to attempt to express himself with confidence on these subjects. For which reason I am ready to acknowledge that it is with considerable reluctance I mention some extraordinary circumstances that have occurred to me in my experiments with the digitalis; and yet I should think it a criminal omission to neglect a single observation, which might in the least degree tend to throw any additional light on a subject of such importance, that is at present but imperfectly understood; and if one of the circumstances that has occurred in my practice had not been already noticed, I should perhaps have suspected the accuracy of my own observation \*.

\* I shall only add, that a remarkable circumstance occurred in a case of anasarca, not taken notice of by Dr. Withering or his correspondents, which is that after I had desisted from the use of the *Digitalis*, in consequence of the swelling of the abdomen having nearly subsided, and the medicine apparently producing a nausea, the patient was for some weeks afflicted with a constant discharge of limpid water from his mouth, amounting on some days to a great degree of salivation.—My friend Mr. Renny, Surgeon to the Royal Hospital, observed the same appearance of salivation attended with a diminution of swelling, in an old man of a worn out constitution, who had taken the *Digitalis* for an hydropic complaint: neither his patient nor mine had taken mercury for a long time before recourse was had to *Fox-glove*. Treatise on the Dropsy of the Brain, &c. &c. by C. W. Quin, M. D. page 97 et 98.

I once met with an instance in an old man, who was upwards of seventy, to whom I had repeated occasions to give the digitalis; and whenever it was given to a certain extent, instead of producing nausea and vomiting, the consequence was a regular salivation, which in general lasted a week or ten days, and then gradually subsided.

The other instance of the singular effects of digitalis was to produce petechiæ. The subject was of a full habit at the commencement of his illness, and had led a life of great intemperance, in consequence of which the whole glandular system was become diseased. My first object was to unload the constitution by purgative medicines, and afterwards I began with a course of digitalis. After having taken this medicine for about a week, I one morning was astonished to meet with a general eruption of petechiæ; my first suspicion was that this was a new disease, and probably the consequence of contagion; but when the method of treatment was changed the petechiæ disappeared. In about a fortnight's time I was induced to resume the use of the digitalis, which was productive of a return of the petechiæ. And as both these patients continued under my care for a considerable length of time, I frequently repeated the experiments that I might be well satisfied of the facts; but I have never since that time met with an instance of salivation or petechiæ.

Soon after the successful case above mentioned, I met with an instance of phthisis pulmonalis in a very advanced stage, and what was considered by the friends of the young woman, who was about eighteen years of age, to be a hopeless case.

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It was accident that brought this patient under my care, and I was happy in the opportunity of making a second experiment with the digitalis in this disease; and, as it was not likely that I should see her a second time, the whole event of necessity depended on the first prescription. I directed five grains to be given every night; and having apprized the parties of the formidable effects of the medicine, I urged every argument in my power to induce my patient to continue the use of it to the last extremity. My directions were complied with, and the effects of the medicine were distressing in the extreme to the patient, and no less alarming to her friends; but when she recovered from the effects of the medicine, she had the satisfaction to find that she had lost her disease.

The success of these two cases created an enthusiasm in favour of the digitalis in phthisis pulmonalis; and I not only eagerly embraced every opportunity that was presented to my attention, but searched with diligence for consumptive cases for the purpose of repeating the experiment.

Whenever a subject becomes an object of enthusiasm, instances are certain to occur; but the same uniformity of success did not attend my subsequent practice. I have frequently met with instances where the digitalis has appeared to be totally inactive, where the pulse has not been affected, or the least sickness or nausea taken place; where the cough was not relieved, the expectoration abated, or the discharge from the issue reduced in quantity.

At first I suspected the imperfection of the medicine; but after having repeatedly given of the same preparation, sometimes with effect, and  
sometimes



sometimes the contrary, I then began to suspect that the cause depended on the state of the constitution.

The digitalis will in many instances sink the pulse both in velocity and power; but it is not an antiphlogistic, it will not destroy inflammation.

This will lead us to one of the most curious circumstances which I have had an opportunity of observing respecting the powers of this medicine, and will serve to illustrate one of the laws of the animal œconomy that deservedly merits our attention. I am well convinced, by the evidence of facts and repeated observation, that the digitalis will suspend a phlogistic diathesis, but will not destroy it. I have given the digitalis for a month together in a phlogistic disease, and by that means reduced the pulse from one hundred and twenty to sixty, and by regular uninterrupted perseverance have limited the pulse to that reduced state for a month together; yet it was evident that the disease was not destroyed; for I have seen instances where the disease has been so far suspended as not to exhibit a single symptom, and then in a few hours to overcome the powers of the medicine; and thus having obtained the superiority, the morbid action has again appeared in full force, and the influence of the medicine sunk into obscurity.

Under these circumstances, if the inflammatory symptoms have been abated by copious bleeding and other antiphlogistic remedies, so as to reduce the disease to such a degree that the powers of the digitalis still retained in the constitution should regain their superiority, the medicine will then resume its influence; and though the disease is not completely  
destroyed

destroyed by the antiphlogistic treatment, and should ultimately prove invincible, yet it will sink beneath the powers of the digitalis, and, for a time, not a single symptom of disease remain. Of all the examples of the suspension of morbid action, I know of none equal to this before us, where two contending powers will reciprocally take the lead in turn.

Now it must be evident that the digitalis is not an antiphlogistic; for if this medicine had the power of destroying inflammation, when the disease had been suspended for any length of time, it would either not return again, or else appear with diminished energy. But if the digitalis is not a direct antidote for inflammation, it frequently becomes extremely instrumental in the removal of its consequences; and under some circumstances, which will be afterwards explained, it sometimes proves an efficacious method of practice to suspend the disease by one power, whilst we destroy it by another.

In the phthisis pulmonalis, the phlogistic diathesis must be nearly conquered before the digitalis can be made use of with advantage; and it is for this reason that this medicine has been found most efficacious when given in the advanced stages of the disease, at that period when the phlogistic diathesis has nearly exhausted its own powers. The first indication in this formidable disease, according to Doctor Gregory \*, is to destroy the inflammatory diathesis; but if the first object cannot be accomplished,

\* In phthisis pulmonalis, the indications of cure which Doctor Gregory proposes are, to remove inflammatory diathesis; to take off determination to the lungs, and to mitigate the severity of particular symptoms. Medical Commentaries, vol. 1. page 123. second edition.

it is not likely that the subsequent plan of treatment should prove efficacious. I am well satisfied that I have frequently succeeded in the early stages of consumption, by a regular system of bleeding and other antiphlogistic remedies; and, on the contrary, I have frequently met with instances where I have carried the antiphlogistic plan to its full extent without success.

I am not unacquainted with what Doctor Reid has said against the propriety of bleeding in consumptive cases\*; but his writings will have very little influence with them who have carefully examined the evidence of nature, and have established their opinion on the more certain basis of experimental authority. I have carried the bleeding system to its full extent, and when I have despaired of success, I have consulted the first physicians in this neighbourhood, and I have not only heard their opinions, but I have read the full extent of their knowledge of this subject in their prescriptions; and have, from such instructive sources of information, formed my own judgement of the present state of the public opinion.

It is not from any motives of humble condescension that I stop to make an apology for this personal allusion; and I flatter myself that I shall not be suspected of blind partiality even to my intimate acquaintance, or that any one will suppose that I am actuated by the dictates of servile fear. My object is to search for truth, and I do not intend that motives of false delicacy should divert me from my purpose.

\* In no disease has bleeding been so generally ordered, and so frequently repeated in a given time, as in that under our consideration; and I fear the observation has been but too much verified, "that more die by the lancet than the lance." Dr. Reid on Phthisis Pulmonalis, page 86. first edition.

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When the inflammatory diathesis is destroyed, Doctor Gregory's second object is to take off determination to the lungs; this part of the subject appears to me in some respects unintelligible, and I must acknowledge I am not acquainted with any medicine, except the digitalis, that seems to coincide with this indication, and this medicine at that day was not in use; so that I cannot say that I perfectly understand either this representation of the disease or method of cure.

When the inflammatory diathesis is destroyed, the next object in my opinion is to correct the formation of purulent matter in the lungs. For, in cases where a purulent expectoration has taken place, if the discharge is only produced by an inflammation of the internal surface of the ramifications of the bronchia, without any ulceration or loss of substance, if the inflammatory diathesis can be destroyed, it is probable that the cure of the remaining part of the disease will in general be readily accomplished. But if ulceration has taken place, it is reasonable to suppose that the difficulty of cure at this period of the disease will depend in some measure on the degree and extent of the ulceration.

But whether the expectoration proceeded from a secreting surface or from ulceration, the indications are the same; the first object is to destroy the morbid action of the system, the second to prevent the discharge; and as the digitalis is the most powerful remedy we are provided with on this occasion, not a doubt remains in my mind respecting the propriety of giving the digitalis, as soon as the inflammatory diathesis is destroyed. The loss of substance in the lungs does not always render the disease incurable, as it sometimes happens that the bursting of a vomica will lay the foundation for a speedy recovery.

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It has already been observed, that a phlogistic diathesis prevents the action of the digitalis on the system, but I do not think that digitalis prevents the operation of antiphlogistic remedies; and on this principle I have frequently thought necessary to anticipate the approach of this second stage of the disease, by loading the constitution with the digitalis before the termination of the phlogistic diathesis had taken place; for by this method, when the disease is sufficiently reduced to admit of the operation of the digitalis, the constitution will be previously charged for that purpose, and its influence will then become apparent. And I have frequently with this view, after having carried the bleeding system to its full extent, finished the cure by suspending the disease by means of the digitalis and destroying the remaining influence of the phlogistic diathesis by a continued use of purgative medicines, given for some weeks every second or third morning. This, in other words, may be said to be removing the disease from the original situation in the lungs by one remedy, and carrying it off through the intestines by another.

One of the most satisfactory experiments of the treatment of phthisis pulmonalis, that ever I have met with, was terminated in this manner. It was not a case similar to the second which I have noticed on this subject, where at a hopeless period of the disease a single medicine was given for a week or a fortnight, and the patient recovered without any other assistance; but it furnishes us with an instructive example of a long continued contest between the salutary powers of medicine, and the destructive influence of disease.

I have already repeatedly observed that the first object in phthisis pulmonalis is to destroy the phlogistic diathesis; but the symptoms of general

ral debility were such in the present instance as to prevent me from trying the bleeding system at an early period of the disease. For the first fortnight I depended upon cooling purges, saline medicines with emetic tartar, and blisters.

As I never yet kept a journal of any case, perhaps it will not be in my power to give a description of this with satisfactory accuracy; but if I cannot give a long history of insignificant minutiae, I can give my own opinion of the result. When a case-writer sits down to give a daily history of the progress of a disease, if he has any particular bias to his views; it is almost impossible but that, in every day's observations, he should anticipate the darling object of his hopes. Perhaps such imperfections may be attributed to an imbecility of mind, to the want of dispassionate reasoning or sound judgment; but, rather than attempt to defend the opposite side of the question, I would plead guilty to the whole, and candidly acknowledge that a consciousness of my own frailty has hitherto prevented me from making the attempt. But if I have it not in my power to delineate all the particulars, I will endeavour to give the best account that a reference to dates and the utmost exertions of my recollection will afford.

The disease lasted for more than seven months, the plan of treatment commencing the beginning of November 1798, and continuing till June following. A regular system of antiphlogistic treatment was employed through the whole of this long interval, during which occasionally cooling purges were given two or three times a week; blisters were frequently repeated, and after the disease had assumed an uniformity of appearance,



one was applied to the lower part of the sternum, and kept open for some months; but here it may be proper to observe, that, whenever the digitalis was given in full power, the discharge from the blister was considerably diminished.

My patient was a very steady, temperate, well-informed young man, about thirty years of age; and having favoured me with the most liberal confidence, he was rationally attentive, careful, and persevering. He was first bled on the eighteenth of November, again on the twenty-fourth, and again on the twenty-fifth, by which the inflammatory symptoms were considerably abated; he continued in the use of saline medicines, with occasional purges, through the whole of December; but in the beginning of January, his inflammatory symptoms having increased, the use of the lancet became again necessary; and he was bled on the fourth, seventh, ninth, thirteenth, twenty-third, twenty-seventh, and twenty-ninth of January, and again on the first and fourth of February.

On the ninth of February he began with taking five grains of the digitalis every night, and continued the use of this powerful medicine throughout the whole of February, March, and April; sometimes omitting it for a week, and at other times diminishing the dose as circumstances might require.

In April the inflammatory symptoms again increased upon us, and he was bled on the second, ninth, fourteenth, and, for the last time, on the twenty-third; the digitalis was continued at times till the beginning of May, and through the whole of that month he took a cooling purge once  
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or twice a week; the last that he took was on the sixth of June; the blister was kept open for some weeks afterwards, and he has continued perfectly well ever since that period. In addition to this description it may be proper to observe, that, though his cough was frequently distressing, and his nights restless, I never gave him a single drop of laudanum, as I consider inflammation and opium incompatible with each other. Those medicines, which have been termed balsamics and pectorals, have I believe in general lost their reputation, but I rather think that modern practice still sanctions the use of those medicines that have been called expectorants; yet if I may presume to give my opinion on this subject, instead of attempting to clear the lungs by expectoration, I should think the operation much more delicate, and the matter more likely to be discharged without coughing, if the disease was carried off per anum.

Having made these general observations on the treatment of the phthisis pulmonalis, it may here be necessary to mention that there is another species of consumption which begins in the abdominal viscera, and it is most probable that the lacteals and other glandular parts are the first subjects of the disease. The first symptoms of this disease are particularly obscure, and the secret operations frequently go on unperceived, until it has become truly formidable, without exciting any great degree of morbid action of the system: the first symptoms are loss of appetite and indigestion, with costiveness and other irregularities of the bowels; and one circumstance I have particularly noticed in a great number of instances is, an uncommon degree of borborygmus from the fluctuation of flatus in the bowels.

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In the latter stages of this disease hectic fever takes place, and ultimately the lungs become affected; but the disease frequently terminates with a formation of matter in the cavity of the abdomen, which sometimes makes it way through the depending parts, either by the side of the rectum in form of fistula, or else through the anterior parts, which ever is most subject to its pressure.

In this disease the phlogistic diathesis does not take place in the early stages, and consequently I think that the digitalis may at such periods be given with greater probability of success. I never met with an instance of this disease that terminated favourably after the matter had made its way externally: but in the early stages, whilst there is a probability of success, I think the indications are plain and rationally deducible from the description I have already given of the nature of the disease. As it is not productive of inflammatory diathesis in the early stages, bleeding will seldom be necessary at this period; and for the same reasons the digitalis will be more admissible.

The object appears to me to be, in the first instance to correct the congestion or approaching tumefaction of the glands of the viscera; cooling purges are well calculated for this purpose, and when the morbid action, which is probably of the inflammatory kind, has been by such means first corrected, the digitalis appears to be strongly indicated; and I should think that a judicious use of the digitalis, and cooling purges in the early stages of the disease, is a method that would in many instances prove efficacious.

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In the advanced stages both of inflammatory rheumatism and erysipelas I have known the digitalis prove a powerful remedy; but in the early stages, before the inflammatory symptoms have been abated, it is a useless medicine. I have lately met with a curious instance of protracted erysipelas, in which the powers of the digitalis were particularly conspicuous.

The disease had existed for more than a month when the patient came under my care, and a variety of remedies were made use of without any good effect. Previous to this illness he was a strong young man about twenty years of age and in perfect health. When I first saw him, the erysipelas was general, and he was swelled from head to foot to a degree that I never before was witness to; and so great was the inflammation over the whole surface that the cuticle was separated, and there was a general discharge from all parts of the body, to such an excess that his linen became wet through in a few minutes after its application, and in a night's time the sheets and blankets were moistened through.

He was every night and morning stripped naked before the fire, and washed all over with vegeto-mineral water, moderately warm; and before the application was made use of, the discharge on his skin might be seen to stand in drops on all parts of his body. His pulse was in general about an hundred and ten, and very full; and as the disease appeared to me highly inflammatory, I began with a plan of antiphlogistic treatment, but the swelling was so great in all parts of his body that it was rather doubtful whether it would be possible to bleed him.

I first began, on the eighteenth of November one thousand seven hundred and ninety-nine, with giving ten grains of calomel at bed time, and a purge the next morning, composed of three ounces of infusion of fenna, an ounce of salts, and half an ounce of manna; the next day he began with alkaline draughts, with a drachm of nitre in each, taken in a state of effervescence, with a full quantity of lemon juice; but this not proving sufficiently efficacious, on the twentieth I took away about twenty-four ounces of blood from the arm; the bleeding was repeated on the twenty-third, but as the exudation from the skin continued in the same state, I then wished to try the effects of the digitalis, thinking that, if the inflammatory action was not sufficiently reduced, I should gain time by previously loading the constitution with this medicine.

On the twenty-sixth he began to take five grains of the digitalis every night, which was continued for a week with very little effect, in consequence of which he then began to take five grains every night and morning. After having continued this plan for two nights and two mornings, his stomach became affected, and the swelling began to abate, and the discharge evidently diminished. I expect that this will be considered as giving the digitalis in full power, and independent of the inflammatory diathesis, which resisted the influence of the digitalis, I am disposed to suspect that the quantity could not have been given with safety; but the antiphlogistic treatment was continued, and the effects of the digitalis evidently became perceptible, in proportion as the inflammatory diathesis abated.

That I may give some idea of the progress and duration of this disease, I shall first mention the dates when he was bled, and always to the amount  
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of twenty, or four and twenty ounces. It has been already observed that the first time was on the twentieth of November, the second time on the twenty-third, which was repeated on the twenty-ninth, again on December the third, the fifth, the seventh, the tenth, the twentieth, and twenty-first; the digitalis was continued, with some intermissions, from the twenty-sixth of November to the twenty-sixth of January; the dose was regularly five grains, sometimes only given at night, at others both night and morning. When it was taken night and morning in general, my patient could not bear above five or six doses, at which times it was omitted for two or three days; in the above-mentioned period he took fourteen doses of purgative medicines, and on the intermediate days took saline medicines three times a day, with a drachm of nitre in each dose.

With respect to the external applications, it has been before observed that he was well washed every night and morning with warm vegeto-mineral water, and he was afterward anointed all over with the ceratum saturni of Goulard, and this method was continued until the disease was conquered. As he was reduced by the long continuance of the disease and the great evacuations that were made use of, I was in hopes the bark might have been given in this instance with advantage; but I only tried two doses of a common decoction which, instead of giving strength, immediately increased the action of the system; and I have no doubt that, if it had been continued for a few days, it would certainly have revived the inflammatory disease; instead of which a few doses of calomel with cooling purges were all the remedies that were afterwards made use of to complete the cure.

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I am happy in this opportunity of acknowledging that one of the gentlemen, who had previously attended from the commencement of this very singular instance of disease, with the utmost candour sent me a written account of the whole treatment to that period. I do not think myself authorized to copy the description he favoured me with, and I should think it very illiberal on my part to pass any comments on what was done before the patient came under my care; but he concluded his observations by soliciting to know the result, and wished to be informed, if the disease continued, "whether any medicines or application should be found of more use than what had been tried in this very obstinate degree of exudation." I have copied this expression from the letter I received with my patient, for the purpose of shewing his opinion of the disease; and I hope that the description I have given of the method of treatment, in addition to the ocular proof he has since had of the patient's perfect recovery, will prove a satisfactory answer.

I have selected these few instances for the purpose of explaining the operation of digitalis under different circumstances; the effects of abating the discharge by the skin, in this case of erysipelas, are particularly illustrative of its powers; but it has been already shewn that a phlogistic diathesis opposes the operation of the digitalis, for which reason it is necessary that the inflammatory action should be considerably abated before the effects of the digitalis can take place. Mr. I. Hunter has given us an example of two morbid actions being incompatible with each other; and I am of opinion that the present circumstances depend upon similar principles. Mr. I. Hunter asserts that, "no two actions can take place in the same constitution, in the same part, at one and the same time;" and as  
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his observations on this subject first made their appearance in the introduction to his treatise on the venereal disease, I was in expectation of finding a full explanation of the most important morbid actions that are incompatible with the venereal disease.

It may here be necessary to mention, that the introduction to the treatise on the venereal disease and that on gun-shot wounds are nearly similar, (I do not say that the diseases themselves are represented as analogous), but it must appear rather singular, that in the former instance the last section, which is on mortification, is preceded by a section on inflammation; whereas, in the introduction to the treatise on gun-shot wounds, the section on inflammation is omitted; but in both introductions he mentions "the suspension or cure of a gonorrhoea by a fever;" which is not given as a matter of opinion, but is certainly represented as an unquestionable truth.

Mr. Pearson is of opinion that neither fever nor inflammation possesses the power of suspending the venereal disease\*; and with respect to the former I have no evidence to produce against him, but I am well convinced from repeated experience that a phlogistic diathesis will completely suspend the venereal disease; and three unquestionable instances now present themselves to my recollection.

The first I shall allude to was a case of erysipelas, where the inflammatory symptoms ran high, where bleeding was frequently repeated, and the

\* Observations on the effects of various articles of the Materia Medica in the cure of the Lues Venerea, by John Pearson, page 84.

blood was strongly marked with size ; previous to the commencement of erysipelas, the patient had a chancre near the frænum, and a venereal ulcerated bubo ; in this state he was attacked with erysipelas, in consequence of which the chancre and bubo both disappeared without any other remedies being made use of, except those of the antiphlogistic kind that were directed for the inflammatory affection. It is now near two years since these circumstances took place, and the venereal symptoms have not again made their appearance ; but as I have known instances where the venereal disease has in this manner been suspended, and not appeared for some years afterwards, it still remains a doubtful question whether this will prove a temporary suspension or perfect destruction of the disease ; and the succeeding instance will convince us of the uncertainty.

In this case the venereal symptoms were strongly marked, and the patient was under a course of mercurial frictions, when he was seized with an inflammation of the liver, which proved a very formidable disease, and continued for four months from the commencement to the time when the disease ultimately disappeared. During the long progress of this acute disease, when the inflammatory symptoms were most formidable, he was bled nine times, to about the amount of sixteen or twenty ounces each ; but bleeding was not the only remedy that was made use of, and I have mentioned the number of times that he was bled more for the purpose of giving an idea of the degree of inflammatory affection, than with any intent of entering into a minute detail of the method of treatment. Calomel and cooling purges were frequently repeated, blisters were also applied to the parts in pain, and all the inferior order of medicines (that are supposed to be efficacious in cases of inflammation) were made use of in  
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full doses to supply the intervals, and at the end of four months he was so well as to leave off medicine. But the progress of the disease was not regular through this long period; at one time it was nearly subdued, and afterwards returned upon us with increasing powers, but ultimately the inflammation was completely conquered, and every symptom of visceral affection disappeared. When the inflammatory disease first took place, every appearance of venereal infection immediately subsided; and as mercurial frictions had then for some time been made use of, the destruction of the venereal symptoms was attributed to the effects of the mercurial applications. This is now several years ago, and my patient was for six years completely free from all appearance of venereal disease; but what is most extraordinary, though he had been perfectly secure from the possibility of any additional infection, after the disease had remained in obscurity for six years, the venereal powers again made their appearance, and he was under the necessity of going through a regular process of cure. We frequently hear of complicated diseases, and I am suspicious that the term is sometimes made use of as an apology for the want of more accurate discrimination; but I am equally well convinced, that instances do frequently take place, in which the constitution is affected with a complication of disease.

I have lately met with an instance of venereal disease and inflammatory rheumatism, both for some time having possession of the same constitution; and as they are two species of diseased actions that are incompatible with each other, they were alternately brought into action agreeably to the influence of their respective powers.

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When this case first fell under my care, the inflammatory rheumatism was seated in the muscles of the chest, attended with considerable pain and difficult respiration; I procured an accurate description of the former progress of the disease; and, as it had then existed for two years, my patient despaired of relief. At that time I could not perceive any other symptoms but those of inflammation, and consequently I at first concluded that the disease was acute rheumatism, and attributed its duration to want of perseverance in an antiphlogistic treatment. I immediately began with bleeding, purging, blistering, &c. &c. which produced every good effect that could rationally be expected. I shall not trouble the reader with a journal of our proceedings, suffice it to say, that I was determined to carry the antiphlogistic plan to its full extent; and judging by the event I am now well satisfied that I fully accomplished my intention.

But the instant one disease was destroyed, a new one, equally painful, immediately took place.

In the former part of this disease the pain was principally seated in the muscles of the chest, and, extending to the shoulders, from thence proceeded to the back part and sides of the head; but it would on this occasion be difficult to point out the different muscles that were affected; and if the present description should be deemed imperfect, and such addition be thought necessary, I shall be happy to have it in my power to indulge the curious reader with a catalogue of their names, whenever a future opportunity may call for a further explanation. But in the second period of this disease, when the inflammatory symptoms had subsided, the pain was most violent on the back part and side of the head, and extended

to all the muscles that are employed in directing the motion of the head backward and laterally, and the pain seemed to centre in the parts where the muscles originate in the basis of the skull. His own description of the commencement of this pain was, that the last bleeding removed his pain from one situation to another, and his expression was, that when the last blood was taken away the pain in an instant shot up into his head. It appeared at first view, as if the disease had been removed from one situation, and had seized other parts with increasing powers; but all symptoms of inflammation had disappeared, and if the present disease was of the rheumatic kind, it must either be the remaining cause, or consequence of the former disease.

The pulse was sunk to the healthy standard, and not a single symptom of increased action then remained; but before I ventured to change the method of treatment, for the purpose of being satisfied that the former disease was completely subdued, one more pound of blood was taken away; and as there was not the least appearance of inflammation remaining, I was of opinion that sudorific opiates might then be made use of with a rational probability of success, and consequently twenty grains of Dover's powder was given at bed time. This, as an opiate for a few hours, procured relief from pain, but was continued for a week without having the least influence on the basis of the disease.

In some of these cases it is to be observed, that I do not mention whether any physician was called in, or what authority I have to appeal to; it is of no importance who directed the proceedings, the philosopher will only wish to be informed what was done, and what were the effects; and



for my own part, I do not intend to implicate others, or to make a search after truth a subject of personal adulation, but consider myself alone responsible for the whole.

In cases of acute rheumatism, when the inflammation has been considerably abated, I have in the subsequent stages frequently made use of the digitalis with unquestionable advantage; and as in the present instance the inflammation had terminated, and sudorific opiates had been tried in vain, I was then induced to try the digitalis, which was continued for about a fortnight, in full doses, without the least salutary advantage.

Let it be here remembered that the digitalis had a fair trial; and as it produced no good effect, it is reasonable to conclude that it has no influence in what proved afterwards to be the real state of the disease, after the inflammation was destroyed; if the digitalis had been an antisyphilitic, and the treatment proved successful, I should never have understood the true state of the disease, but concluded it had been the remains of the rheumatic affection.

But during this time a very small tumour formed at the top of the head, which ultimately proved to be a venereal node; at this time I had not lost sight of the rheumatic affection \*, and Mr. I. Hunter observes,

\* When the periosteum and bones become affected, the pain is sometimes very considerable, and at other times there is hardly any. These pains are commonly periodical, or have their exacerbations, being commonly worst in the night. This is common to other aches or pains, especially of the rheumatic kind, which the venereal pains resemble very much. When the pain is the first symptom, it affords no distinguishing mark of the disease, it is therefore often taken for the rheumatism. I. Hunter's Treatise on the Venereal Disease, second edition, page 329.

“that

“that nothing but some particular circumstance in the history of the case, or some symptom attending it, can lead the surgeon to the nature of the complaint.” The tumour was about the size of a horse bean, was hard, without any perceptible fluctuation; and as every other attempt to relieve the pain had been inefficacious, I was induced to cut through the tumour completely down to the bone. A very small quantity of a curdy matter was discharged, but without producing any good effect, the pain still continuing in nearly the same state.

A few days after the tumour was opened, on examining the parts with a probe, I discovered that the skull was diseased; this excited my suspicions, and, on more minute enquiry, I found that about two years before that time he had had a venereal infection, but considered himself as completely cured; from all these circumstances I was well satisfied that the venereal affection had been suspended by the inflammatory rheumatism, and that the latter being now completely destroyed, the venereal powers had again resumed their action, in consequence of which I immediately had recourse to mercury. I gave calomel internally, guarded with opium, and had the painful parts well rubbed with mercurial ointment; by the second night the pain was considerably abated, and by continuing the use of mercurials, the disease was completely cured.

The lues venerea being a disease that affects the whole constitution, it is only by diseases whose powers are equally extensive that this can be suspended, and it must be equally evident that the suspending power must be superior to that which is suspended; but what is the nature of this superiority I cannot take upon myself to determine. The diathesis  
phlogistica

phlogistica will suspend the venereal disease, and the digitalis will suspend inflammation; but this powerful medicine has no influence over the venereal disease, it will neither diminish gonorrhœa, chancre, nor bubo, nor, as has been shewn above, in the least alleviate the deep seated pain that depends on a venereal origin; and these phenomena are certainly worthy our attention, though they may not admit of a full investigation.

The influence of the digitalis in abating the discharge of an issue, which was so particularly striking in the first case, in which I found it an efficacious remedy, immediately suggested the idea that it might prove a useful medicine for the purpose of stopping the discharge in gonorrhœa; and as Mr. I. Hunter had shewn that this disease was not attended with loss of substance in the urethra, I thought there was some probability of the experiment being attended with success.

I had at that time a strong young man under my care, with a gonorrhœa of long standing; and as he wished very much to get rid of his disease, I proposed the experiment, with a full explanation of the subject. The proposal met with his approbation, and I kept him under the influence of the digitalis for a fortnight; but without the least influence over the disease. As he adopted the plan with considerable heroism, the medicine was given to its full extent, so much so, that at the end of the first week his sickness was distressing in the extreme, in consequence of which the dose was then diminished, but the nausea was kept up, though in a less degree; so long as we preserved our hopes of success, the disagreeable effects of the medicine were not considered of much importance: but the patient had the mortification to be disappointed of a cure, and I of the hopes of being the author of a new discovery.

I have



I have selected these few instances for the purpose of illustrating the effects of the digitalis under different circumstances; if I was to give a description of every case I have met with, they must in many instances prove a repetition of the same thing; and it is not necessary to produce a multiplicity of evidence in support of facts that are so strongly characterized, or of experiments that may be so readily repeated. It is not a medicine whose influence is obscure, or whose effects are doubtful; but wherever the digitalis is introduced in practice, its powers must be known to all who are capable of making observations.

I cannot conclude this description of the effects of the digitalis without expressing my astonishment that a medicine, possessed of such powers, should have been unknown to Doctor Zimmerman, at the time he was called upon to attend the late King of Prussia. If he had been acquainted with the progress of the science of medicine in Great Britain, he certainly would not have limited his prescriptions to the juice of dandelion, which his august patient so justly termed a *fiddle faddle* medicine. But, animated with the heroism of the immortal Frederic, he would have directed the powers of medicine to the conquest of disease with the same probability of success that the monarch had been accustomed to conduct his victorious armies through the field; and, instead of lamenting the want of medicinal agency, or of trembling at the consciousness of his inability to give relief, he would with confidence have explained his intended operations, and recommended his prescription by the most rational assurances of the speedy good effects, and might with propriety have promised an alleviation of the oppressive symptoms; which would certainly have been considered, for the time, a conquest of the disease.

He has given to the world a narrative of his important embassy, and I have no doubt but he has told the truth; the whole of which only serves to shew the splendour of retiring magnanimity on the one hand, and the humility of the physician on the other.

I do not on this occasion forget that the peruvian bark is a powerful medicine which has been in general use for more than a century, and that in many instances our knowledge of its power is still uncertain. The first introduction of the bark into the practice of physic was in cases of intermittents, and we find that it is in the advanced stages of fever that its salutary influence is most to be depended on; and as these diseases exhaust the animal powers and induce debility, and as the restoration of returning health was found to give fresh energy to the system, it was probable that the first idea of relaxation of the constitution, and the tonic powers of certain medicines, originated from these circumstances. It is also probable that by a loose analogy, founded on arguments equally fallacious, certain diseases were termed putrid, and the remedies antiseptic; but in both instances the language is as delusive as these opinions are inconsistent with the principles of animal nature.

The musician may talk of relaxation and want of tone. The mechanic will best understand the expansion of metals, and may give his opinion respecting the dissolving powers of heat, and the contrary influence of cold; and will perhaps suppose that the cold bath operates on the animal body in a manner somewhat similar to the effects of the quenching trough on a piece of red hot steel. The cook will be best acquainted with the putrid tendency of summer's heat, and the antiseptic powers of vinegar  
and

and salt ; but none of these facts are applicable to the phenomena of animal life. I hope it will not be thought necessary to produce examples in support of every illustrative observation ; but if any objections should be urged against these arguments, I would refer the reader to Mackbride's Experimental Essays, where he will find a number of experiments on the antiseptic powers of fixed air, that bear a strong analogy to some of the facts above stated.

There is great reason to suppose that this was the book which Mr. Cartwright \* alluded to in his account of the use of yeast in putrid fevers,

\* I observed, says Mr. Cartwright, in a small corner of the room, a tub of wort working. The sight brought to my recollection an experiment I had somewhere met with, 'of a piece of putrid meat being made sweet by being suspended over a tub of wort in the act of fermentation.' The idea flashed into my mind, that the yeast might correct the putrid nature of this disease ; and I instantly gave him two large spoonfuls. Gentleman's Magazine for September 1799, page 762.

#### EXPERIMENT 16.

I plunged into this gallon of fermenting liquor the very identical piece of mutton that had served as a standard in the 6th experiment, on the acids ; and which, from lying in an open cup for several days, was grown so soft that I was obliged to tie it round with a piece of thread, (for when the thread was passed through it, the flesh was so tender it would not hold) and so extremely putrid that the stench was intolerable.

In one hour the putrid smell was much abated, and at the end of *five* entirely gone, the meat being now firm, and perfectly sweet ; it was hung up in the open air, where it soon became dry, and remained sweet ever after.

#### EXPERIMENT 17.

In order to see whether this change depended on the liquor, or on the vapour, I suspended a thin bit of putrid mutton in the mouth of the vessel wherein the *wash* was fermenting, but so as not to touch the liquor, and left it there during the night ; in the morning it was found plumped up, sweet, and firm. Mackbride's Experimental Essays, page 132 et 133.

though



though he candidly acknowledges that he did not recollect the name of the author; and this omission may readily be accounted for, as it is evident that the science of medicine was not the leading object of his literary pursuits. I do not mean to insinuate that his descriptions of diseases are less accurate than some that have been already noticed, which had the advantage of a professional pen; or that these examples of case-writing are less deserving of our attention. They are all represented as instances of extreme danger, and the respective recoveries as miraculous cures; but if the descriptions had not been so superlatively characterized, they all would have been less liable to suspicion.

In the first case of putrid fever described by Mr. Cartwright, bark and wine were given with other medicines, the particulars of which are not explained; but the disease grew every day more untractable and malignant; two spoonfuls of yeast were then given, but whether it was repeated once, twice, or three times, or how long it was continued, is not mentioned. We are only told it was given once, with directions to be repeated every three hours, if the first dose succeeded; but we are not informed whether the first dose was successful, or how far these directions were complied with. In a few days the boy is said to have recovered, and, after that short interval, to look surprizingly well; and he acknowledged that he felt better from the instant he took the yeast.

Let it be on this occasion remembered, that this was the period at which he was supposed to be in a dying state; and I will venture to assert that, under such circumstances, it is not probable, let the powers of medicine be ever so great, he should have been so immediately sensible of their effects.

effects. I do not wish to depreciate the use of fermenting liquors in putrid fevers, as I am well convinced, from repeated experience, of their salutary powers, and have at the time I am writing a patient under my care, who has been taking new ale out of the working vat for some days, with the strongest marked symptoms of its good effects; it is the description and not the remedy that I disapprove. But these examples may serve to prove that truth is frequently the offspring of error, and valuable discoveries are sometimes produced by a happy jumble of mistakes.

The next case was under the care of some apothecary in the county of Leicester, who at last finding every effort to be of service to his patient baffled, he told Mr. Cartwright that he considered it to be a lost case, and that in his opinion the man would not survive twenty-four hours. It must appear rather singular that there should be such a coincidence of opinion in all the descriptions of dangerous cases; if we look back to the case of mortification described by Mr. Douglas, the life of the patient was then limited to twenty-four hours, the other case, where the patient died, was limited to twenty-four hours, and this is limited to the same space of time. At this critical period two spoonfuls of yeast were given, and we are informed "that in fifteen minutes the pulse began to get composed and full, and in thirty-two minutes from taking it, he was able to get up from his bed and walk." After this satisfactory observation Mr. Cartwright then adds, "at the expiration of the second hour, I gave him a basin of sago, with a good deal of lemon, wine, and ginger in it. He ate it with an appetite. In another hour I repeated the yeast; an hour afterwards I gave the bark as before; at the next hour he had food; next had another dose of yeast; and then went to bed: it was nine o'clock. He told me he had a good night, and was recovered."

After this a third case is described, in which the recovery is equally miraculous; but as it frequently happens in formidable instances of putrid fever that the patient will continue in a state of delirium for a week, and sometimes for a fortnight, and after this recover, it must appear to be an hastily and unjustifiable decision in the present instance to limit the short remains of life to twenty-four hours; and that there cannot remain a doubt with all those who are capable of forming a judgement on this subject, that, if the recovery was as here stated, the patients were not in such a state of certain danger as is here represented when the yeast was had recourse to; as a recovery from such a state of danger, in thirty-two minutes, cannot to any rational mind appear within the limits of probability.

I have frequently seen instances of putrid fever where I could not answer for the life of the patient for twelve hours together, and yet they have lived for years. But in such cases, where the event is doubtful, it must of course be impossible to prognosticate with certainty; and if the danger had been as great as here represented, the recovery would not have been so expeditious and successful. It is ridiculous to suppose that two spoonfuls of yeast should, under such circumstances, in fifteen minutes give a fulness to the pulse and produce such wonderful effects, except this salutary ferment had been immediately introduced into the blood vessels by the ingenious art of transfusion; and thus, by one happy exertion of philosophical dexterity, the whole mass of blood might have been excited into reanimated motion. But one of these cases is sanctioned by the concurring testimony of an apothecary in the county of Leicester, and perhaps this may be considered a species of authority that but few will presume to call in question.

But



But what is most singular in this description is, that in the first case bark and wine were both given, and the disease continued to increase until its progress was stopped by the yeast; and though in the two last cases the disease is supposed to be stopped in so short a time by the salutary powers of the yeast, yet the use of bark and wine is continued in the first case, and bark alone in the second. I do not mean to insinuate that this practice was improper, I only wish to observe that as yeast and bark were both alternately given, it must be more difficult to determine to which the success is to be attributed. It is not my intention to discourage the use of yeast and fermenting liquors in putrid fevers; but in my opinion new ale taken from the working vat certainly deserves the preference; in the first place it will furnish a much larger quantity of fixed air than a spoonful of yeast; it contains sugar which is both salutary and nutritious; and a glass of new ale will prove an agreeable draught to the thirsty patient; from which it is evident that new ale will serve both for medicine, nourishment, and beverage. It is not for the purpose of opposing the practice that I make these observations, I only wish to set forth the imperfections of case-writing, and to promote a more accurate examination of the subject.

We frequently find that, after the powers of the constitution have been much depressed by long continued disease, as soon as the cause is removed and the vital powers relieved from the oppression, if the bark or any other restorative or tonic medicine is given at this critical period, the energy of returning health is frequently mistaken for the effects of medicine; when in reality it is the returning powers of health set free from the oppression of disease, and resuming their former functions.

But

But it is particularly after fever that the powers of the bark are most conspicuous; it may act in part as a cordial or stimulus to the system, but I am disposed to think that the salutary effects depend more on its powers of destroying the last effort of fever, than by exciting the healthy powers to stronger action.

It will here be necessary to observe, that it is in the last stage of fever that the bark is most efficacious, after the paroxysm of an intermittent or in the advanced period of putrid fever; and as the morbid state of the system, which precedes the commencement of mortification, is a disease of the putrid kind, it must a priori appear a proper remedy in this disease; but I am well satisfied on the authority of experience, and the evidence of facts, that I have seen its effects in mortifications more clearly exemplified than in any other species of putrid disease.

When mortification takes place in consequence of external injury to the extremities, it has already been shewn that the previous inflammation is not productive of fizy blood, which I consider a state of the constitution incompatible with the salutary influence of the bark; and this is also a species of disease that is unconnected with any of those affections of the viscera which frequently accompany putrid fever, and which would render the bark improper. The object on this occasion is, to stimulate the sinking powers into action, and to prevent the absorption of the putrid sanies; and I am well convinced of the influence of the bark under such circumstances, and have repeatedly had the satisfaction of noticing the progressive effects of its salutary powers.

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When inflammation and suppuration have taken place in the extremities, and the discharge become putrid, absorption will sometimes take place in a single lymphatic, and will mark its progress by a red streak up the limb; under such circumstances I have frequently had opportunities of trying the effects of the bark, and have found that the progress of the disease was immediately put a stop to, and the absorption, which was making its way up the lymphatics, immediately compelled to take a retrograde course, and in twelve hours I have seen the discharge from the ulcerated parts put on an healthy appearance. This certainly must be considered as ocular demonstration of the salutary powers of the bark in cases of mortification, and is a species of evidence which every one, who will be at the trouble to attend to the progress of such diseases, must have frequent opportunities of observing. But if the bark does possess the power of preventing the progress of mortification under certain circumstances, we are not to conclude that every kind and degree of this disease will admit of cure; and, on the contrary, if we are to discredit the virtues of a medicine because it does not in every instance prove successful, the whole *materia medica* must lose its reputation.

But in a number of instances where the bark is supposed to be an efficacious remedy, it will frequently prove an arduous task to distinguish between the operations of medicine, and the powers of nature set free from the influence of disease.

When the disease completely terminates, and the recovery is perfect, the salutary operations will regain their influence, and the powers of nature resume their former energy, independent of the stimulus of tonic



medicines. But if the circumstances are such that the disease does not admit of perfect cure, then the restoration of the powers of nature will fall short of the degree which they possessed when the reduction first took place.

Let us suppose, for instance, that there is some chronic disease of the lungs, liver, or any other viscus which is incurable, that the influence of this disease has extended to the system, and that some general affection has taken place; if the diathesis is inflammatory, bleeding and purging will be necessary, and by these means the morbid action of the system may be considerably diminished; but as the visceral disease is supposed to be incurable, the constitutional affection cannot be completely destroyed. If then, under such circumstances, the remaining powers of the constitution should be to a certain degree exhausted in expectation of destroying the disease, the returning energy of the system will become conspicuous, as soon as the debilitating plan of treatment is suspended. We will suppose, for instance, that the reduction is brought to that degree that the morbid action may be thought to disappear; if then the debilitating influence of medicine should be removed, the constitution will seem to recover new powers, and the patient will be flattered with the sensations of returning health, and a daily accumulation of increasing energy will become perceptible; but this will never amount to the degree which the constitution was in possession of before the reduction first took place.

It must appear evident to those who will take a rational and candid view of the subject, that it is not in the power of medicine to add to the original powers of the constitution. I have no doubt but bark, cold bathing,

bathing, and many other remedies may be made use of with great advantage as restoratives to health, but we cannot by any means increase the original stock, or give fresh powers to animal nature. It is the business of medicine to destroy disease, and regulate the actions of the system; we may destroy the morbid actions but cannot add to the vital powers; for if we could add to the powers of nature, we might then continue to accumulate, and the vital powers might then for ever be supported; every kind and degree of mortification might find its antidote, and man become immortal.

When a disease is completely destroyed, the powers of health will then appear in full force; but in cases where the cure is only half completed, the remains of disease will frequently retain sufficient influence to prevent returning health; and under such circumstances, neither cordial food nor tonic medicines will be able to rouse the languid powers of the constitution sinking under the oppression of disease.

In a case of inflammatory rheumatism, in which the symptoms were all strongly marked, the first time I visited my patient, (who was when in health a strong man about thirty years of age), I took away about twenty ounces of blood, gave ten grains of calomel at bed-time, which was followed the next morning with two ounces of Glauber's salts. On the second day in the evening I took away twenty ounces more blood, and the next morning gave salts without a previous dose of calomel. The third day he took a neutral medicine with nitre; which was regularly continued afterwards, except when it was omitted on account of purgative medicines. The same day in the evening a second dose of calomel was taken, and the next morning two ounces of Glauber's salts.

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On the fourth day after the second bleeding there was an evident increase of disease; in consequence of which, I wished the bleeding to be repeated, but the vein being small and deep seated, and only having the light of a small candle I did not succeed; the next morning I visited my patient for the purpose of renewing the attempt, when I succeeded by opening the vein with a large orifice; and being apprehensive that the difficulty of performing the operation would be every time increased, I was determined to make the most of the present opportunity, and in consequence I was induced to take away two large basons full of blood; which were found on examination to contain exactly one pound each. This immediately produced a reduction of the painful symptoms; ten grains of calomel were given in the evening and a dose of salts the morning following, which was once after repeated in diminished quantities; the neutral medicine with nitre was given in the intervals, and in about a week's time the patient was completely recovered.

Whereas I am well convinced, on the unquestionable evidence of other cases where bleeding was not made use of with the same liberality, that if, on the contrary, bleeding had only been made use of in small quantities in the present instance and at longer intervals, the cure would have been but imperfectly performed, and a state of apparent debility have continued for a length of time afterwards. But if the disease in the first instance is completely conquered, the powers of health will then be set at liberty to resume their functions, in consequence of which the exhausted state of the constitution will be soon restored; returning appetite will dictate the propriety of a liberal indulgence in the use of cordial food, and its salutary effects will soon demonstrate the restorative influence on the constitution.

But



But, in cases where the cure is imperfectly performed, the constitution is left to labour through the remaining difficulties, and continues in a state of debility, fluctuating in an unsettled medium, not gaining the powers of health nor freed from the influence of disease. Under such circumstances cordial food and tonic medicines would increase the debility; neither Brown's diffusible stimuli, Solomon's balm of Gilead, nor Brodum's nervous cordial, would in such cases give energy to the languid powers. And it is my opinion that bleeding, calomel, and purgative medicines, will on many occasions be found the most certain restoratives to health.

By an inefficacious and inenergetic plan of treatment the disease is left to prey upon the constitution, and perhaps exhaust the powers of life; whereas, on the opposite side of the question, the loss of a few pounds of blood, or the effects of a powerful purge may be soon restored. It is a method of treatment under which, on the part of the physician, there can be no justifiable cause of apprehension; and I am well convinced that, if there is any danger of losing the patient, it can only be by a complete and speedy cure.

In all cases of debility, it seems to be the object of modern practice to load the feeble stomach with bitter draughts and stimulating food; but the Brunonians on this occasion violate one of the most rational principles of their own hypothesis, and darken one of the brightest rays of this celebrated system. If we examine this new explanation of the laws of animal life, we shall find that the perfection of health depends on a due equilibrium being preserved between the excitability of the system, and

the operation of the exciting powers. But it is also admitted that, as the original quantity of excitability cannot be increased, it consequently follows that the more the excitability is stimulated into action, the greater will be the expence of this first principle of life; and as the stomach is the medium through which the constitution is to receive the fresh supplies for the support of life, it is reasonable to infer, that, when all the powers of the constitution have been much reduced by disease or other causes, the more the action of the stomach is excited for the purpose of giving strength, the more that weakness will be increased which it was intended to remove.

Eating and drinking are certainly necessary for the support of animal life; but I am well satisfied that a spare diet will contribute more to health and strength than all the indulgences of luxury and ease. The sumptuous banquet, the sparkling glass, warm rooms, and beds of down, may be both convenient and necessary for those whose powers are nearly exhausted, but their cordial influence is only of short duration; and if this is to be considered a life of pleasure which sometimes gives short hours of joy, they are mixed with years of pain.

But the Brunonian theory and practice did not always coincide with each other; for though in many instances Brown's opinion of animal nature might be nearly right, yet his principles of practice were generally wrong. This at first view may appear rather singular that a philosopher, who had abilities sufficient for the investigation of the animal powers in a state of health, should be so perfectly unacquainted with the nature and treatment  
of

of disease. But notwithstanding all that can be said in defence of his professional abilities, I shall presume to contend that an analysis of the first principles of disease and the medicinal treatment were subjects with which he was unacquainted.

His advocates may represent him as the first scholar and philosopher of the age; they may assert that his language was equal to that of Horace, who was his favourite author \*, or that he could speak with the persuasive eloquence of Cicero †; that his knowledge of animal mechanism was equal to that of his more successful countryman ‡; and that his investigations of the works of nature were of more importance than those of Sir Isaac Newton ||. That when the *Elementa Medicinæ* made its ap-

\* He maintained the independence of his character, proving himself to be, in the language of his favourite Horace,—*Satis inter vilis fortis*. The life of Brown, by Beddoes, page LIII.

† Cicero and Bacon were his favourite authors; in his elaborate compositions he imitated the Roman orator with affectation. The life of Brown, by Beddoes, page xcvi.

‡ It is a singular coincidence, that the two individuals, who in these times have been principally celebrated for their attempts to extend the knowledge of animal nature, should have been both natives of Scotland, and that each should have been put to a coarse mechanical employment—John Brown to the trade of a weaver, and John Hunter (according to common fame and the report of one of his biographers) to that of a carpenter or wheelwright. The life of Brown, by Beddoes, page xxxviii.

|| The introductory lecture, if my memory is accurate, was intended to impress upon his audience a sense of the importance of the lecturer's discoveries; its effects was rather to render him ridiculous. The dread of pain and death easily persuade us that improvements in medicine are more beneficial than in any other art; but when a man asserts the superior utility of his discoveries to those of Newton, he will with difficulty avoid the appearance of asserting the superiority of his talents. The life of Brown, by Beddoes, page lxxxvi.

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pearance in the world, all former systems sunk into obscurity, and that his great genius shone superior to all that went before him.

But if I was compelled to acknowledge all this as truth, still I should contend that the practice of physic was a subject which exceeded the utmost limits of his extensive information. For he had no practice\*, and consequently had no opportunity of observing the phenomena of diseases, of noticing their progress, of studying their nature, or learning the method of cure. He speaks of Sydenham with contempt†; one whose professional reputation was established on the accuracy of his practical observations, his strict attention to the operation of medicine and the influence and progress of disease. Whereas the Brunonian system originated in a fit of the gout‡, and his materia medica was confined to the class of diffusible stimuli||.

\* To some readers it may appear strange that I should have finished the life of a physician, who caused so great an uproar in the medical world, without more particular notice of his private practice. I enquired with some solicitude, but in vain, whether during the long period of his studies he was peculiarly observant of diseases. The life of Brown, by Beddoes, page ciii.

† Calefacients, or heating things, were one of the means that the alexipharmic physicians employed to force perspiration; but the principle is now laid down, that shews they produce the opposite effect. Hence the merit of Dr. Sydenham in recommending cold, both in the small pox and in peripneumony, in which disease he took his patients out of bed, and placed them in an easy chair. Happy had it been for the profession, and happier for the sick, had he extended his improvement to the measles and catarrh, and all the rest of the few sthenic diseases, and stooped there; but by extending his antiphlogistic and refrigerant doctrine to the whole form of asthenic diseases, the harm and good he did were in the proportion of 97 of the former to 3 of the latter. Brown's Elements of Medicine by Beddoes, page 99.

‡ Preface to the original work.

|| Double Rum and Laudanum. The life of Brown, by Beddoes, page lxxi.

IF

If we examine the different kinds of debility that affect the animal system, independent of their original cause, we shall find them vary according to the period of life and other circumstances. I shall not take upon myself to point out what plan of regimen may be fit for youth, nor what may be necessary for old age ; it is only to what I conceive to be the prevailing opinion respecting the use of those medicines called tonics and restoratives, and what is supposed to be a coincident plan of regimen that I shall presume to give my opinion.

The bark stands at the head of the bitter class of medicines, which is sometimes united with mineral acids, and sometimes with chalybeates ; and I have seen such quantities of tonic medicines prescribed, as the strongest stomach in a state of health would not be able to support. I have seen instances where the bark has been prescribed as a tonic in the subsequent stages of inflammation, and could produce the most satisfactory evidence of the unfriendly consequences ; and I have also seen the bark prescribed in hectic fever, but as medicines will not perform impossibilities, they consequently do not on all occasions produce the desired effect. I recollect a case of this kind, when in the first instance the Doctor, having been disappointed of success, but not deprived of confidence in his own opinion, nor having become doubtful of the propriety of the plan of treatment, but supposing that the want of success depended alone on the want of power, expected that quantity would supply the place of propriety, and directed a double dose for the purpose of compelling the morbid powers to submit to the irresistible influence of medicine, though ever so irrationally applied.

This stimulating system, this plan of flogging the wearied powers of nature into action, is a method of practice which I have often had an op-

portunity of observing with silent admiration. I have seen a plan of cordial medicines for a long time employed in vain; and when all powers have failed, I have known hot wine directed at the close of life. It is a subject that reminds me of the conduct of Bajazet on the death of Arpasia, where he says—

Fly, ye slaves!

And fetch me cordials. No, she shall not die!

Spite of her sullen pride, I'll hold in life,

And force her to be blest against her will.

Perhaps such dictatorial authority may be considered as consistent with the character of a general, and may have its influence in the field; but the powers of life are neither to be retained nor recalled by the energy of language, nor will the accumulated powers of ill-directed medicine insure success.

Under the head of regimen, eggs are frequently directed as the most restorative food that the weak and debilitated convalescent can make use of; and so high is the reputation of this system of modern luxury, that eggs make a very important part of the fashionable breakfast. They are, I suppose, intended to supply the animal system with abilities to serve for the business of the day, to give strength to debility, to support the energies of health, that the nerves and muscles may all enjoy the reanimating influence of their invigorating powers. The inebriate, trembling under the debilitating influence of his evening glass, makes eggs the basis of his morning hopes; but the state of his stomach in the morning is as much disordered as his head, and is as incapable of performing the business of digestion, as his trembling hand would be unfit to guide his pen.

When



When and where this practice first originated I will not attempt to prove; but I am of opinion there is some reason to suspect, that a certain line in Prior's poems \* has contributed more to the popularity of this system than all the medical writings put together. Eggs, jellies, and shell-fish, have long been in high reputation; but with what motive they are in general made use of I shall not presume to determine. Arbuthnot asserts, "that the inhabitants of sea-port towns are generally prolific†". And as this implies an extension of animal life, perhaps it may be reasonable to infer that the produce of the sea furnishes a kind of food that increases the vital powers. But let what will be the principle on which the opinion is founded, eggs have long been considered the restoratives to health and support of life, the multum in parvo, the primum mobile, the grand concentration of animal vitality.

But to complete the whole of this invigorating plan of regimen; that the stomach may be induced to co-operate, and the powers of digestion be called in action, at the same time that the stomach is supplied with reanimating food, when a new-laid egg is mixed with a bumper of madera wine, the utile et dulce are both at once obtained. But this is no more than beginning the business of the day with one glass in the morning, to prepare the way for a bottle in the afternoon. On this occasion the liberality of prescription is not limited either to quantity or

\* Thus, tho' she strictly did confine  
The Doctor from excess of wine;  
With Oysters, Eggs, and Vermicelli,  
She let him almost burst his belly.

† Arbuthnot on Aliment, page 82, third edition.

kind;

kind; the latter does not seem to be an object of consideration, and the former is only to be determined by its effects. The convalescent is directed to take wine in moderation, and a hiccup is the criterion to determine the proper dose \*.

Red port is frequently directed as a bracing cordial, and will in general be preferred in the afternoon, whilst egg and maderia will be considered most eligible for the morning dose; and it is a kind of prescription so agreeable to the frailties of human nature, that it is certain to be approved. Such then we find is the theory and practice of physic, which the luxury of medicine and the refinement of speculative philosophy have presented to our view; such is the modern treatment of debility; such the plan of regimen that is to supply the exhausted stores of the constitution; and such the system of intoxication, which is not only to prove a restorative to health, but which is also to give energy and power to all the joys of life.

\* A convalescent from a disease of debility was prescribed wine, but not to carry it to excess. A hiccup was the signal, by which he was to understand that he had carried that stimulus too far. He desisted, and ended his jollity with two or three tumbler glasses of water; which prevented the establishment of the indirect debility into which he was about to fall. Brown's Elements of Medicine, by Beddoes, page 22.

## SECTION XI.

### THE OPERATIVE PART OF SURGERY CONSIDERED AS A REMEDY FOR DISEASE.



THE operative part of surgery has long been looked up to as a subject of great importance, and may justly be considered as one of the exclusive privileges of the profession. We meet with many pretenders to the other branches of medicine, but the instances are very rare where any of them will presume to use the knife. It is a business that soon exposes the want of knowledge; the inability to perform an operation is a species of ignorance that cannot be concealed.

There was a time when a knowledge of this subject was confined to such narrow limits, that the performing of operations was not generally understood, and was considered an unquestionable mark of a superior professional accomplishment. But when the study of anatomy was set



free from legal restraint \*, that species of information, which is necessary for conducting operations, soon became an object of general attention; and so great was the ardour with which the students in surgery pursued this splendid branch of their profession, that, in a very few years after this emancipation, we find Mr. Pott † became apprehensive lest every other part of surgery should be set aside as unworthy of attention.

If we consider this only in a mechanical view, it is certainly a species of knowledge easily to be obtained; but it will be impossible to make an

\* Before the late act of parliament for making the surgeons and the barbers of London two separate and distinct corporations; the surgeons, who were members of the then united company, besides being subject to the power of spiritual courts, were liable to many heavy charges, amounting often to more than 100l. before they had served all the offices of the company. And the privileges and advantages they enjoyed, being chiefly under charters granted them in different reigns, were lately found very precarious, and not able to screen them in Westminster Hall from several expensive offices, from which they were formerly supposed to have been exempted. But since the obtaining the abovementioned act, all their said privileges are confirmed by the sanction of parliament, with the addition of several new ones.

It must be confessed, that both anatomy and surgery flourished much later in England than in France, where all possible encouragements were given to both; while, in London, the governors of the two hospitals, being mostly citizens, out of a false policy, entirely refused the education of pupils in one hospital, and allowed of but nine at a time in the other. And the rulers of the barber-surgeons company at the same time contrived a by-law to prevent the knowledge of anatomy from spreading; cunning by foreseeing that the younger surgeons by that knowledge would advance too fast upon them. They made it a penalty of ten pounds to dissect a body out of the hall without their leave, which was scarce to be obtained: and if any one offended (as they called it) they were sure to be prosecuted. The improvements in anatomy and surgery, since these restraints have been removed, will sufficiently convince the world of the unsuitness of them. Le Dran's Surgery, with remarks &c. By William Cheselden, Esq. page 470 et 472.

† Pott's preface to *Observations on Fistula Lachrymalis*; and preface to *Observations on Wounds on the head*.

accomplished

accomplished operator except the art and science of surgery are both united. Dexterity may be acquired by habit ; but the most accomplished address in the management of instruments will be inadequate to the purpose, except it is accompanied with scientific information to direct the knife. Amputation is without doubt a business which any person may get through with, but I think it will not be impossible to incumber the subject with such difficulties, as some humble operators would not know how to answer. And if we consider that people seldom act with steady fortitude when the mind is agitated with doubt, and their thoughts fluctuating in uncertainty, we must acknowledge the propriety of determining every doubtful question before the operator presumes to take the knife. Many little circumstances may occur to embarrass a timid operator that are insignificant in themselves, which nothing but a complete knowledge of the subject can prevent ; and it is of much more consequence to those, in whose limited practice operations occur but seldom, to have the mind at ease, than to those who by daily habits are fortified against the difficulties of accidental disappointments.

The rash audacity of ignorant presumption may sometimes protect a daring desperado through difficulties, which timid caution would meet with trembling apprehension : but the steady fortitude of an accomplished operator must depend alone on a scientific basis.

Great as is the importance of anatomy in many of the first departments of medicine, and particularly in the operative part of surgery, this alone will not be sufficient for our present purpose : as it will be impossible to determine with precision when an operation is necessary, or in  
what

what manner it ought to be performed, without an accurate knowledge of the nature, extent, and disposition of the disease. For without an accurate knowledge of chirurgical diseases, it will be impossible to form a rational judgement when, where, or in what manner, an operation should be performed.

A knowledge of anatomy is in the first place necessary to determine, in cases of external injury, whether the extent of the injury is such as to be incompatible with life. But if the blood-vessels are not injured, the extent of the injury to other parts less essential to life will also merit our attention; and as this is a question that cannot be determined by any certain rules, and must depend on an infinite variety of circumstances, that never can in any two instances be perfectly the same, it must ever remain a subject for the exercise of opinion.

If I should be accused of magnifying the importance of this question, I would beg leave to refer to a case before-mentioned \*, in which two opposite opinions were given and the last was wrong. Had the error been on the other side, the patient would have lost his limb; but instead of his limb he lost his life.

The practice of public hospitals is, in general, represented as much more worthy of attention than the examples of private practice, and is frequently brought forward by the writers on surgery with a proud boast of their superior importance. Whether this imaginary superiority depends on the abilities of the surgeon, the advantages of consultation, or

\* Section x. page 257.



the cautious attention that a conscious apprehension of the critical observation of the public eye may inspire, are interesting points which I shall not now attempt to determine. But as hospital surgeons have thought fit to represent their public practice as most worthy of attention, the practice of the hospital must be looked upon as public property; and I shall consider myself at full liberty to display their virtues, and make such observations as will serve to illustrate the subject before us.

I am ready to acknowledge that the case here referred to was extremely critical; perhaps it was an even chance whether the patient did or did not recover without amputation; but, under this supposition, it would have been more liberal and more prudent to have acquiesced in the first opinion, as in such cases it is impossible to determine with certainty. If we could first obtain a perfect knowledge of the powers of life, and then form an accurate estimate of the degree of injury, and if we had any method of comparing the joint influence of these opposing powers, we might then attempt to give a solution to this question. But as these data are not within our reach, it must remain at best a matter of opinion.

I consider this case well worthy of our attention, both in a scientific and practical view; it will serve to shew how cautious we should be in forming an opinion, and to estimate what delicate reserve is necessary, when, on a question of such importance, one surgeon presumes to oppose the opinion of another.

It is probable that a patient under such circumstances would prefer the proposal for saving his limb; and if the opposite opinion was urged,

and assented to, he might reflect on the surgeon afterwards for what some might consider a rash and hasty decision; whereas if the attempt to save the limb was not successful, death would kindly interpose to stop the murmur of complaint.

To support the first proposal would require more confidence than in general falls to the lot of a single individual; the latter is protected by the appearance of humanity, and ultimately justified by the uncertainty of success, even when there is least reason to be apprehensive of disappointment. What renders this question so particularly interesting is, that it is a judgment beyond which there is no appeal; for when the decision is once made, the fate of the patient is irrevocably determined. When inflammation has seized the part, and fever taken possession of the constitution, amputation would then increase the danger; it would be an additional insult to the powers of nature labouring under the pressure of previous disease.

As inflammation of the injured part and constitutional fever are the two important circumstances which constitute the danger, yet it may sometimes happen that mortification may take place independent of these circumstances, and in such cases amputation may become admissible. I well remember a case in point; the injury was occasioned by a very extensive cut with a sharp instrument on the superior part of the foot, by which the three largest metatarsal bones were divided. The hæmorrhage was considerable, but was immediately stopped by bringing the parts together with a large needle and strong ligature, and the parts were then covered with dressings, in hopes that they would unite by the first intention.

I shall

I shall not attempt to justify what was done in this case, or recommend the same practice on similar occasions; I only wish to describe the facts as an illustration of the present subject.

The attempt to unite the parts by the first intention did not succeed, and mortification took place in those parts that were deprived of the circulation: As soon as the mortification was discovered, the foot was divided up between the third and fourth toe, and the incision met at right angles by a second on the inferior part of the foot, by which the injured parts were completely removed, and not a single difficulty afterwards succeeded to interrupt the regular process of the cure. The question then will be whether the operation was too insignificant to affect the constitution, or whether the constitution was in a state susceptible of its influence.

If we refer to the conclusion of Mr. Pott's observations on the mortification of the toes and feet, we shall find that he particularly advises against operations of much less importance. It is not my intention to represent these as two similar species of disease; but if they are not perfectly similar, the objections to amputation are in many respects applicable to both instances. Mr. Pott observes, that "if the parts adhere by only a single living fibre it ought not to be divided," whereas in the case above stated several inches of living substance were cut in two. On the present occasion it is most probable that the parts beyond the incision died away for want of a necessary connection with the vital organs, and that mortification took place in the extremity of the foot not in consequence of active disease, but because the parts were cut off from the original source of the vital powers.

I should



I should think it probable that the spontaneous termination of gangrene in most instances depends on its locality, and that the rapid and destructive progress of the true spreading gangrene is always connected with a putrid diathesis of the system. This may depend on the nature and extent of the injury, the state of the constitution, and an infinite variety of other circumstances, which it would be impossible to anticipate, or estimate their respective influence. But whether the disease is local, or connected with a putrid diathesis, amputation is an improper remedy for mortification. In the first instance, it will certainly increase the danger, and it can never be necessary, as the mortification will stop spontaneously, and the accumulated injury of an operation would be certain to bring on additional inflammation, which might be productive of dangerous and important consequences; and, on the second occasion, it must be very obvious that it will prove a useless operation to cut off a limb when the whole body is diseased.

In our examination of this subject we shall find, as far back as Wiseman's time, that he did not consider amputation a proper remedy in such cases. In the case copied from Mr. Douglas, it was evidently his opinion that amputation was an improper remedy in mortification; but about the year forty Mr. Sharp, in a more full and accurate discussion, placed this question in a clear and intelligible point of view. When the facts had once been clearly stated, the arguments properly arranged, and the whole subject placed upon a rational basis, experience confirmed the propriety of Mr. Sharp's decision, and general conviction gave a uniformity to the public opinion.

Here-

Here the business rested for upwards of twenty years, when the appearance of \* M. Bilguer's dissertation on the inutility of amputation once more disturbed the tranquillity of the public mind; and if we consider the present unsettled state of the subject, it will be impossible to conjecture at what future crisis we shall meet repose.

It certainly must be looked upon as an indelible reflection on the English character, that a work so truly contemptible should have had such extensive influence; but the captivating attractions of novelty, and the fascinating powers of great names, will always have their right with those who, not possessing abilities to think for themselves, depend alone on the authority of others. But it is probable, in this instance, that the high reputation of the monarch, whom Bilguer at that time served, gave a celebrity both to the author and his book, which neither intrinsically had the most humble claim to.

But the appearance of this translation immediately attracted the attention of the public, and first having imposed upon the credulous, it soon became a subject of general controversy; and though Mr. Pott's arguments on this occasion are too plain to admit of misrepresentation, and his decision so particularly satisfactory, still we find, both in theory and practice, that the question remains in an unsettled state.

\* See a dissertation on the inutility of the amputation of limbs, written in latin by M. Bilguer Surgeon general to the armies of the King of Prussia, augmented with the notes of Mr. Tissot, physician at Lausanne, now first translated into English by a surgeon. London, printed for R. Baldwin, at the Rose, in paternoister Row, and T. Becket and P. A. De Hondt, in the Strand. 1764.

I remember, more than twenty years ago, attending the lectures of one of the partisans of Bilguer, and can now recollect the particular books that were recommended on this subject; but Mr. Pott's arguments directed my opinion to the opposite side of the question. Many of the little pamphlets that made their appearance at that time have long sunk into obscurity, which in their day might serve the purpose of amusing those whose attention could be captivated by such writers as Tissot, or whose opinions could be influenced by such surgeons as Bilguer. But when erroneous opinions prepare the way for free and liberal enquiry, they may ultimately serve the cause of truth, and blind zeal may lead the way to useful information and important discoveries.

Wifeman, who was surgeon to Charles the second, wrote in that auspicious reign; and though he did not anticipate the modern theory, yet he was not less attentive to the phenomena of nature. The style in which his book is written varies much from that of modern times, there is a plain unadorned simplicity of expression that is not frequently to be met with in writers of the present day. His manner is certainly that of a plain practical writer, but the whole is strongly marked with unquestionable evidence of highly cultivated professional information.

When we consider that Wifeman's surgery is not a work of theory, but a description of the observations of extensive practice, we shall cease to wonder he did not see the full extent of the evidence which he had so accurately recorded. The necessity of immediate amputation in cases of external injury is particularly noticed, and the impropriety of using amputation as a remedy to stop the progress of mortification is mentioned



tioned in some instances. On the first part of the question his opinion is clear and decisive, on the latter we meet with some ambiguity; and it is evident that the nature and treatment of mortification were then very imperfectly understood, and the whole veiled with obscurity.

He was truly sensible of the difficulties with which he was surrounded, but does not appear to have formed a decided opinion in what instances amputation was improper. This important subject has been repeatedly discussed within these last sixty years, but if we except the writings of Sharp and Pott we shall not meet with many observations that are worthy our attention. If I was to recommend books to a young student in surgery, the works of Wiseman, Sharp, and Pott, would certainly furnish much useful information on this subject. But as we have so many great names in support of a new system of obscurity, it is necessary that the road to truth should be clearly pointed out.

We hear much of the improvements of modern surgery, but it is my opinion that we shall find more rational information in Mr. Wiseman's book than in all the chirurgical publications of the succeeding hundred and thirty years. I do not pretend to assert that this with the two authors above mentioned would prove a sufficient guide for inexperience; nor would any other professional works prove adequate to this important purpose.

It is the business of literature to put the mind in action and teach mankind to think, and not to make them dupes to the dictates of a single author. It is the subject at large, and not the opinion of an individual,  
that

that the student should have in view. It is a knowledge of nature, and not of books alone, with which the man of science is to ornament his mind.

The necessity of early operations in cases of external injury was well known to the author before us, and seems to have been much better understood at that time than by the generality of modern surgeons. Wiseman, in his treatise on gun-shot wounds, says, "The part is at first dressing to be cleared with what diligence you can of all such foreign bodies as have made violent intrusion into it, while the Patient is warm with the heat of Battle, and the Wound fresh, and very little altered by either Air or Accidents: Upon which consideration less Pain must necessarily follow upon the extraction.

"In the Armado Naval of *Dunkirk*, where the Chirurgeons were oft employed in this kind of work, we after every Fight went together visiting one another's wounded men. It was thought amongst us a great shame, if any thing of this work of Extraction were then to be done: For after the first and second day the Wound proveth tumified, also the neighbouring parts are inflamed, and so changed in their temper, that they conceal from your sight both the Bullet and his companions, so that the place they are coucht in can hardly be known; or, being discovered, you cannot without hazard of your Patient, or great trouble of the Part, make extraction of them. In which case it may then be reasonable to defer that work, and by Lenients to hasten digestion \*."

\* Wiseman's Surgery, page 400.

These few lines of Wiseman contain more useful information than half the books that have been since written on the subject. He directs that the parts be first cleared with diligence, but that diligence is to be guarded with caution.

If it was my intention to enter into a regular examination of Wiseman's writings, it might then be necessary first to give a biographical illustration of the genius of the author; and the different situations in which he was placed during that eventful period would furnish us with many amusing subjects well worthy of our attention. But there is one circumstance that I cannot let pass unnoticed, as it is of a professional nature, and may on a future occasion be urged against the authority of his opinion. If our author was sincere in what he has written on the King's evil, I am ready to acknowledge that it would be a difficult task to justify his credulity of the infallibility of the Royal Touch \*. But there was no period of time when human nature was exempt from folly; and as the present age will

\* "What great difficulty we meet with in the Cure of the King's Evil, the daily experience both of Physicians and Chirurgeons doth shew. I thought it therefore worth my while to spend a whole Treatise upon the Subject, and very particularly to go through the description of it, informing thereby the young Chirurgeon whatever is requisite to the Cure, at least as far as it cometh within the compass of our Art. But when upon trial he shall find the contumaciousness of the Disease, which frequently deluded his best care and industry, he will find reason of acknowledging the goodness of God; who hath dealt so bountifully with this Nation, in giving the Kings of it, at least from *Edward the Confessor* downwards, (if not for a longer time) an extraordinary power in the miraculous Cure thereof. This our Chronicles have all along testified, and the personal experience of many thousands now living can witness for his Majesty that now reigneth, and his Royal Father and Grandfather. His Majesty that now is having exercised that faculty with wonderful success, not only here, but beyond the Seas, in *Flanders, Holland, and France* itself." Wiseman's Surgery, page 239.



not presume to boast of having reached the summit of perfection, it would be uncandid to reject one opinion that appeared rational, because we did not meet with a uniformity throughout the whole.

In every appeal to high authority the general character of the author is certainly a very interesting part of the subject; but in the present instance it is the state of surgery at that period which I wish to bring forwards, and not to prove that surgeons were then infallible. It is not the name that will sanction an opinion, or the elevated situation that will give celebrity to the doctrines which I shall have occasion to refer to; but as the evidence of nature is immutable, the coincidence must prove their intrinsic merit. For the purpose of giving an impartial view of this subject at that time, I shall endeavour to trace the method of treatment recommended by Wiseman through the whole process, from the commencement of the accident to the termination of the disease.

The similarity of Wiseman's description of a gun-shot wound to that of Mr. I. Hunter's is particularly striking; it is probable that the theoretical views of the latter might be the most refined, but it is very evident that they both were describing the same appearances.

Wiseman says, "Where the Bullet pierceth, it extinguisheth the natural heat, and the Lips of the Wound are livid or blackish; and if they be not dress'd rationally, they inflame, and are accompanied with Tumour, and Blisters frequently rise about them, also the matter is of a fetid smell. In this condition the Wound is commonly the first day, and so to the seventh; and, if not succoured, it gangrenes, and so the Patient commonly dies\*."

\* Wiseman's Surgery, page 297.

Mr. I. Hunter observes that "Gun-shot wounds, from the circumstance of commonly having a part killed, in general do not inflame so readily as those from other accidents; this backwardness to inflame will be in the proportion that the quantity of deadened parts bear to the extent of the wound, from which circumstance the inflammation is later in coming on, more especially when a ball passes through a fleshy part with great velocity; because there will be a great deal deadened, in proportion to the size of the wound; therefore inflammation in gun-shot wounds is less than in wounds in general, where the same quantity of mischief has been done\*."

Thus it is evident that they both agree in their account of the appearances, and in their opinion respecting the slow progress of the inflammatory symptoms. The plain reason therefore why gun-shot wounds do not inflame so quickly after the accident, is, because the parts most injured are deprived of life and consequently incapable of inflammation.

The inflammation takes place in the living parts that have received a less degree of injury for the purpose of separating the dead parts; and the inflammation is in a less degree than if the parts were greatly irritated by the injury, which would be in proportion to the degree of injury if the parts were not deprived of life.

I have seen instances of this kind in accidents from other causes; one I recollect of a lacerated wound occasioned by the plank of a wooden bridge giving way as a very heavy man was passing over it, his leg slipped between the two planks, and a very large portion of the integuments and

\* I. Hunter on gun-shot wounds, page 524.

part of the muscles of the calf of his leg were torn up, but in such a manner as to preserve a very broad basis at the superior termination. It was thought at first that the life of the part might be preserved, and that a reunion might take place ; but these expectations were not justified by the event, and the part died away.

The next question therefore was, whether the separation should be performed by the knife, or whether the business should be left to nature. When I examined the parts for this purpose, I found that Dame Nature had begun the operation ; and as I was apprehensive that any interference on my part might be resented as a presumptuous insult, I was contented to remain an humble spectator of her proceedings.

Notwithstanding the violence and extent of the injury, the plethoric state of my patient, with a general concurrence of circumstances that were all of the unfavourable kind, the general inflammation was of a very inferior degree, and the tension of the parts extremely inconsiderable. But that kind of inflammation, which precedes a dissolution of animal life, marked the line of separation, and this operation of nature proceeded with a regular and uninterrupted progress, and the dead parts were separated as completely as if it had been done by the knife. I have mentioned this circumstance merely for the purpose of shewing, that the same species of diseased action may take place from other causes, and is not solely limited to cases of gun-shot wounds.

The first object, that presents itself in the treatment of gun-shot wounds, is the extraction of the ball and other extraneous substances ; but on this  
occasion



occasion it will be necessary to consider, whether the operation of extraction will do more injury than letting the ball and other substances remain. The importance of this business is in general greatly magnified, and consequently the danger is frequently increased by operations that are unnecessary: the first question that is asked on these occasions is, whether the ball has been extracted, as if the life of the patient depended alone on this single circumstance. Instances do frequently occur where small quantities of extraneous matter will produce very distressing symptoms; but in cases of gun-shot wounds the dangerous consequences of the retention of the ball, &c. will depend on a variety of circumstances, which it would be impossible to enumerate.

Wiseman seems truly apprehensive of the danger of adding one injury to another, and on this subject recommends the most prudent caution; and it is scarcely possible that the necessity of early decision should be more strongly recommended, where he says, that "after every fight the surgeons went together visiting one another's wounded men; and it was thought a great shame if any of this work of extraction was then to be done."

I am willing to allow that since that day our knowledge of anatomy has been much improved, that many general laws of the animal œconomy unknown at that period, have been since investigated: but it is equally evident that these surgeons had frequent opportunities of observing the evidence of nature, and that they have faithfully recorded the facts which came before them.

It is this which marks the distinction between the partial knowledge of the practical surgeon and the more extensive views of scientific inquiry; and it too frequently happens that, because the former shall have accidentally noticed the operations of nature in a single instance, his opinion shall be preferred to that of the man of science, who, with more enlarged views, attempts to investigate the whole. But whether the science of I. Hunter, or the practice of Wiseman has the lead, I hope it will still be considered a great shame amongst army surgeons, if the business of extraction is deferred to the next morning, whenever this operation is indispensably necessary.

On the propriety of early amputation Wiseman is equally pointed, clear, and decisive; he not only appeals to the state of the body, but he considers the mind at that time in a proper state to meet the conflict. He says, "In heat of Fight, whether it be at Sea or Land, the Chirurgeon ought to consider, at the first Dressing, what possibility there is of preserving the wounded Member; and accordingly, if there be no hopes of saving it, to make his Amputation at that instant whilst the Patient is free of Fever, &c \*." It is almost impossible that an opinion should be expressed in language more plain, and intelligible; and in many other parts of his work he gives his opinion with equal perspicuity.

In the description that he has given of a wound in the joint of the knee, he says, "This Wound was mortal the very minute it was inflicted, and the party ought then to have been dismembered: But such proposals were not admitted of in the first dressing, whilst there was, as they

\* Wiseman's Surgery, page 441.

judged,

judged, hope. Afterwards the vehement pain brought suddenly on severe Accidents, as Fever, *Delirium*, &c. and then it was too late to make Amputation \*." From these observations it is evident that Wiseman was well convinced of the propriety of amputation, and was equally apprehensive of the danger of delay.

It is a question which extensive experience must in a little time determine, if those, who have an opportunity of observing the progress and termination of this disease under different circumstances, have discernment sufficient to form a rational conclusion. But in private practice, if a man was to build all on his own experience, the number of instances would be inadequate to the purpose; and it is in this point of view that a long connected series of experience will form an aggregate of evidence so well deserving our attention.

It is rather singular that Sharp and Pott should be the only writers since that time who have placed this question in a proper light, and given a rational and unclouded view of this important subject. The ambiguity of Mr. Bell's opinion has already been examined, and I am still provided with Mr. I. Hunter's in reserve.

If this was merely a theoretical speculation, or only a question of literary controversy, it would then have less claim to our attention; but I am well convinced that instances frequently occur, where the life of the patient falls a sacrifice to this unsettled state of the public opinion. I well remember a Gentleman, some years ago, giving me an account of a case

\* Wiseman's Surgery, page 420.



of amputation that happened near his place of residence; and after describing what he knew of the circumstances he asked my opinion respecting the probability of success, my answer was, that the man would surely die. The confidence, with which I expressed my opinion, excited the astonishment of my friend, who replied, that the injury was received only two days before, that it was thought right at first to attempt to save the limb, but, the symptoms proving unfavourable, it was that morning determined to sacrifice the limb for the sake of saving the patient's life.

For the purpose of supporting my opinion I immediately produced Sharp's Critical Enquiry, and read such parts of the chapter on amputation as I thought most applicable to the question before us, and earnestly requested my friend to mark the event: observing at the same time that, if the patient should recover, I would willingly resign all pretensions to a critical knowledge of my profession.

All the information that was necessary towards determining this question was, when the accident happened, and when the operation was performed; and if I had not thought the authority of Sharp sufficient, I might have answered in the language of Wiseman, that "then it was too late to make amputation." It would be impossible to do justice to this subject without giving very large quotations of Mr. Pott's opinion: indeed I consider his remarks on amputation so particularly interesting, that every one, who wishes to obtain a knowledge of his profession, should be well acquainted with the whole; but one observation is so particularly applicable to the present occasion that I shall give it in his own words. He says, "When inflammation, irritation, and tension have taken place,  
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and when the air admitted freely into the tela cellulosa has begun to exert its pernicious influence, it is too late; an operation then, instead of being beneficial, would prove destructive \*."

When we enumerate the great improvements that have taken place since that time, we must view with admiration the maturity of Wiseman's opinion on the subject of amputation, and more so, if we consider that it was the result of his own observation, the information of his own practice; as it is a question of much greater difficulty to form an original opinion, than to reason on the opinions of others. I have no doubt but Mr. Pott's observation on this subject was as much his own as that of Wiseman, and consequently the coincidence is more striking; he was not at that time examining the opinions of his predecessors, his object was to expose the follies of Tissot and Bilguer.

The first question having been determined, and the decision made in favour of an attempt to save the limb, our next object will be to examine the remedies that were at that day made use of, if mortification afterwards took place. For in doubtful cases it will be impossible always to judge with certainty, and it must also frequently happen either that the inflammation has advanced too far, or that mortification has taken place before professional assistance can be procured.

Under these circumstances the simplification of modern surgery has much to boast of; and though the disease will frequently prove superior

\* Pott's remarks on the necessity and the propriety of the operation of amputation, page 52.

to all the powers of medicine, if we cannot always command success, (as this is a question that can only be determined by the event,) it will be right to act with as great care and attention as if success was certain. At that time the bark was not known as a remedy in this disease, nor was opium, which is the most powerful cordial in the whole materia medica, made use of on these occasions: and as it is the use of external remedies that at this time engages our attention, I shall omit to examine the ancient plan of internal treatment.

The grand remedies of ancient surgery in cases of mortification were scarifications, the actual cautery, and powerful caustic applications. The dressings were all of the stimulating kind, and the degree of heat, with which they were applied, would in many instances create a mortification, if none before existed. But the cautery is now exploded; scarifications, if ever at this time thought necessary, are conducted with suspicious caution; mild applications are generally preferred; and, if fomentations are made use of, I believe the degree of heat is not in that extreme.

It was the boast of Sharp and Pott that the cautery was exploded before their time; and though I do not recollect it having been recommended in print since the date of Mr. Sharp's publication, yet I am apprehensive that it long survived that period. And if we only look back to the time of Mr. Cheselden, we shall find that both cautery and scarifications were sanctioned by the first professional authority.

One motive for copying the case from Mr. Douglas was for the purpose of giving a complete example of the method of treating mortifications;



tions ; and though the practice may have sunk in energy, it does not afterwards appear that any new opinion was offered to the public on this subject, except the mild method which Mr. Pott has recommended in one particular species of this disease. With respect to scarifications, Mr. Pott disapproves them on all occasions ; and it is reasonable to suppose that the appearance of his observations would mark the termination of this irrational practice.

It was in the first stage of the disease, with respect to the necessity of early amputation, the extraction of extraneous matter, and what other operations were necessary in the first instance, that Wiseman seems to have formed a much better judgment than of the subsequent treatment.

On the use of amputation as a remedy for mortification when it has taken place, he appears less decisive, and rather seems suspicious of its efficacy in some instances than convinced of its general impropriety. The expression above noticed is certainly very pointed where he says, "it would be then too late to amputate," but we do not on this occasion meet with a perfect uniformity of opinion. In the case of mortification of the toes and feet he says, "Some other Instances I could give of this kind; but this may serve to shew you to what little purpose Amputations are in these cases \*."

From which it is evident that he very much doubted the propriety of amputation ; and we find that sixty years afterwards the consultation, in

\* Wiseman's Surgery, page 439.

the case described by Mr. Douglas, were all of opinion that taking off the limb would be of no use.

The result of Wiseman's experience strongly points out the impropriety of amputation as a remedy in cases of mortification; but when he attempts to give a theoretical opinion, he expresses himself in favour of this practice. The first case that he gives, in his chapter on gangrene and sphacelus, is a mortification in the arm in consequence of a gun-shot wound \*; but in this instance the patient was permitted to die without amputation being ever mentioned; when from his own description there was certainly an opportunity of performing the operation, if it had been thought advisable.

The description of his practice is clear and intelligible, but his theoretical opinions are obscure; and he seems to recommend amputation in compliance with the prejudices of the times, in opposition to his own conviction. If Wiseman's theoretical observations on this subject be examined with attention, it will appear evident that the whole is the offspring of conjecture; he recommends what he thinks would be advisable in such cases, but if he had been describing the evidence of his own practice, the different events would have determined the instability of his opinion.

In one instance, when he states the question whether the amputation ought to be done in the sound part or the dead†, it is reasonable to suppose he alluded to that period when the progress of the mortification was

\* Wiseman's Surgery, page 433.

† Wiseman's Surgery, page 440.

terminated;

terminated: so that amputation, in this instance, can only be made use of for the purpose of removing a dead part and making a convenient stump; and for this purpose he with great propriety recommends that the operation should take place above the mortification.

But in cases of spreading gangrene he says, "This I confess frustrates all manner of Amputating, whether in sound or mortified Parts \*. If Wiseman had stopped here, his observations on this subject would have anticipated the opinion that Mr. Sharp gave above sixty years after, which may with great propriety be considered a new æra in the science of surgery. But unfortunately Wiseman's imagination was then on the wing; and when the mind once soars into the regions of conjecture, reason loses its influence, and the evidence of nature escapes our observation. For he then adds, "Yet, generally speaking, the Gangrene doth not grow so fast but that, if you make Amputation two fingers breadth, more or less, within the live Flesh, you may prevent it; and that far better than it is possible to be done by the other way of operating \*".

If this important question had at this day rested on the rational decision of Sharp and Pott, I should not have thought necessary to trace back this imperfection in surgery for the last hundred and thirty years. But the ambiguity of the present state of the public opinion will, I have no doubt, be considered a sufficient apology.

The unsettled state of the public opinion has been already pointed out in a number of instances, but Mr. I. Hunter's observations on this subject

\* Wiseman's Surgery, page 440 et 441.



particularly merit our attention; and if we consider his opinion to be the standard of modern practice, the comparison will enable us to form a judgment of the state of surgery at these two distant periods: the ancient practice resting on the authority of Wiseman, who was surgeon to Charles the second, and the state of modern improvements depending on the sanction of Mr. I. Hunter, who enjoyed similar honours under George the third.

I have before observed that Wiseman's theory and practice do not coincide, and that his practice in many instances was judicious and well conducted, but his theoretical opinions have very little claim to our attention.

If it was his opinion that amputation would stop the progress of a spreading gangrene, how must we account for the omission in the case before mentioned, where \* mortification took place in consequence of a gun-shot wound in the arm?

\* A Person having been shot in the arm, and the Wound undigested, I being consulted advised laying open of the Wound, and extraction of the Bullet, Rags, &c. but was over-ruled by others, and it was deferred to farther consideration. Two days after I visited the Patient, and asked the Chirurgeon whether he had laid open the Wound. He replied, there was no need, for he could turn his finger in it and pull out the Bullet and Rags if it was necessary. As I was going out of the house I met the Physician, who inquiring of me the Patient's health, I replied that the Chirurgeon had unwittingly given me the certain sign of his Death. *For in magnis vulneribus & parvis, si Tumores non appareant, ingens malum.* That was a great Wound, and not being digested, should have been accompanied with Fluxion and Inflammation; the Lips should have been full, the Orifice contracted: but on the contrary, the heat was decayed, the Lips were lank without sense, and at that time Sphacelated. A day or two after he died, too certainly justifying my prognostick. Wiseman's Surgery, page 433.

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It is evident from his own account that there was a sufficient time to have tried the experiment; but the truth is, the knowledge he had obtained from practical observations, in similar cases, convinced him that amputation would not stop the progress of the disease. This was a case in which it is reasonable to suppose that he would have been particularly attentive; as his opinion in the first instance was rejected, and as the surgeon who opposed him was not successful, he would have had an additional inducement to exert his utmost abilities at a more advanced period of the disease; and as a physician was also consulted, under such circumstances it is probable that every assistance would be given which the united powers of surgery and physic could afford.

The manner, in which Wiseman addressed the physician, evidently shews the want of concord between the two surgeons, and his disapprobation of the method of treatment; as it is probable that he attributed the mortification to the retention of the ball. At this critical period, if amputation could have been made use of with any probability of success, though Wiseman thought proper to retire in disgust and leave the patient to his fate, it is equally singular that the other surgeon did not, under the sanction of the physician's opinion, have recourse to amputation, if by the operation he could have saved his patient's life; as at the same time he would have had the superior satisfaction of healing his wounded reputation, and claiming superiority of professional discernment.

But a spreading mortification had taken place, and the surgeons and physician were all convinced that it was a lost case, and admitted of no

redress.

redress. And the strong terms, in which Wiseman \* urges the necessity of early amputation in cases that are likely to terminate in mortification, evidently shew how well he was convinced of the inefficacy of this operation during the progressive state of the disease.

Such was the state of this subject one hundred and thirty years ago, and the use which Wiseman had made of his own experience was a high compliment to his professional abilities and the perspicuity of his understanding.

In this state the question continued until it was more accurately examined by Mr. Sharp; but after he had cleared up the whole and defended his opinion by a system of satisfactory arguments, still the inattentive too frequently fell into the errors of former opinions. To obviate this unpardonable violation of rational practice, and for the purpose of answering Bilguer, Mr. Pott urged the importance of the subject in more plain and pointed language: but even this was not sufficient, for, as if it was the natural propensity of human nature to prefer falsehood to truth, darkness to light, and error to perfection, it seems to have been the leading object of modern writers to bewilder themselves and embarrass others.

I flatter myself I have already proved that the opinions of Wiseman, though sometimes erroneous and in many instances imperfect, are still intelligible; and I shall now endeavour to shew that the opinions of Mr. I. Hunter are not only equally erroneous and imperfect, but in many instances unintelligible.

\* Wiseman's Surgery, page 441.



Mr. I. Hunter is the last and most important writer on this subject, and the deserved celebrity of his professional reputation must recommend his book to the attention of the public; for this reason it is more particularly necessary to point out such parts as are likely to mislead the inexperience of youth, as authority is the only standard which the immaturity of reason can appeal to.

The directions, which he has given respecting the extraction of balls and other extraneous substances, are directly contrary to those of Wiseman; disapproves of early extraction, and asserts that "opening on account of extraneous bodies at first cannot be of so much service as opening some time after \*." He thinks it is better to undertake operations of this kind when the parts are in a state of inflammation, than to finish the business of extraction before any diseased action does take place.

But if the attempt is not made early, it must be obvious to every one, who is practically acquainted with the subject, that the inflammation is the first consequence of the exertions of nature to relieve herself from the incumbrances; and if this business is done easily by the assistance of surgery, the inflammation is in part prevented. But if the operation is delayed, and inflammation takes place, the difficulty of extraction will be then increased by the tumefaction of the wound; and the parts being at that time rendered acutely sensible by disease, it would be extremely dangerous to dilate the wounded parts under such circumstances, and the consequences might prove fatal without any adequate probability of success.

\* I. Hunter on Gun-shot Wounds, page 533.

The same rule will here become applicable that should regulate our conduct in every department of surgery, not to add injury to a part already under the influence of disease. It is a law that should be held sacred, and merits our attention on every occasion from the drawing of a tooth to the amputation of a limb. I cannot say that I ever met with an instance of spreading gangrene having taken place in consequence of drawing a tooth; but I have known very extensive inflammation, abscess, and loss of substance immediately succeed this violent operation, when the parts were rendered acutely sensible by previous disease.

If a tumour is opened by incision before the inflammation has terminated in suppuration, additional inflammation is certain to take place. It is not my intention to assert that it is always necessary that all gun-shot wounds should be opened immediately, or that at all events it is absolutely necessary that the ball and other substances should be extracted; I only wish to be understood that, whatever operation of this kind is thought necessary, it must either be done before inflammation has taken place, or after it has subsided.

Mr. I. Hunter seems to insinuate, that it has been a common practice to enlarge gun-shot wounds with the knife on all occasions, independent of any views of extracting the ball and other substances. If such ever was the general practice, it was certainly right to point out the impropriety; but for the honour of the profession I should hope the contrary; and as Mr. I. Hunter was under the necessity of exercising his imagination for the purpose of finding a case in point, we may reasonably conclude that it was an error in practice which he had no right to complain of; for, if this  
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had been a common occurrence, he must certainly have met with frequent instances, and he might have given us examples, without exposing the parties, much more consistent and natural than this abortive deformity of an heated imagination.

He says, "a reason given for opening gun-shot wounds is, that it takes off the tention arising from the inflammation, and gives the part liberty \*;" but this observation appears to me so irrational, that I cannot suppose any one, who had the least pretensions to a knowledge of surgery, would be guilty of such an inconsistency. If this or any similar observation had ever been made in print, it should have been brought in support of the accusation, as it is not necessary to add imaginary difficulties to the practice of surgery, when the imperfections are sufficiently numerous already.

The same principle, which should regulate our conduct in inferior operations, will also in general be found equally applicable to all; but when we meet with opinions without any rational foundation, or practical directions unconnected with scientific principles, it is reasonable to expect contradiction and obscurity; if on this subject Mr. I. Hunter had preserved an accurate uniformity, his opinions might have proved less vulnerable, and his authority might have superseded the united dictates of Sharp and Pott's opinion.

He first observes that "the removal of injured parts should not be done immediately," but directly offers an argument to the contrary,

\* I. Hunter on gun-shot wounds, page 534.

when



when he with great propriety adds, that by immediate amputation you have only inflammation in consequence of the operation; but in the next line he changes his mind, and observes that this is a bad recourse; and in the next page he expresses himself in the strongest terms, where he says, that "it admits of dispute whether at any time and in any place amputation should be performed before the first inflammation is over."

But if the degree of injury is such, that the first inflammation is likely to terminate in mortification and that in death, I should think that there cannot remain a doubt respecting the propriety of immediate amputation: but, in support of a contrary opinion, our learned author immediately adds, that "if the patient is not able to support the inflammation arising from the accident, it is more than probable he would not be able to support the amputation and its consequences."

But here it will be prudent to recollect that it is an unquestionable misfortune which too frequently takes place, that gun-shot wounds and other injuries produce a degree of inflammation which will inevitably terminate in mortification and death; and as it also very fortunately happens that we meet with instances of recovery after amputation, there can be no question which, under such circumstances, ought to be preferred.

His object seems to be on all occasions to delay amputation as long as possible, though at the same time there is not the least doubt of its ultimate necessity; from which it appears to have been his opinion that a state of danger was more desirable than a state of safety, that two inflammations were better than one, and that a protracted disease was preferable to an expeditious cure.

When

I have repeatedly observed that it was the object of Mr. Pott's publication to set this question in a clear point of view; and as what he has written is certainly preferable to every description that has yet made its appearance on this subject, if his opinions did not appear satisfactory to the author before us, their validity should have been examined, and the arguments replied to.

But Mr. I. Hunter loses sight of the most important object, and disguises the subject with a new statement of circumstances that, in my opinion, can never occur in practice. For, after reluctantly acknowledging the necessity of amputation in cases where the patient would inevitably die without it, he says, "How far the same practice is to be followed in cases which we may suppose will not kill, but the part is so hurt, as to all appearance not to be in the power of surgery to save, I will not now determine. This is a very different case from the former, and its consequences depend more upon contingencies, so that the part should be removed only when the state of the patient in other respects will admit of it; but this is seldom the case, for few people in full health are in that state, and still less so those who are usually the subjects of gun-shot wounds; the situation they are in at the time, from the hurry of mind, makes it here in general to be the very worst practice; it will in general, therefore, be much better to wait till the inflammation, and the effects of both the irritation and inflammation shall be gone off."

"If these things are not sufficiently attended to, and the first inflammation, as in the first stated case, (for instance, that which is likely to prove mortal) is allowed to go on, the patient will most probably lose

his life ; or if the first inflammation is such as is likely to go off, according to the last stated case, then we should allow it to go off before we operate, and not run the risk of producing death by an operation ; for I have already observed, few can support the consequences of the loss of a lower extremity when in full health and vigour : we know that a violent inflammation will in a few hours alter the healthy disposition, and give a turn to the constitution, especially if a considerable quantity of blood has been lost, which most probably will be the case where both accident and operation immediately succeed one another \*."

It is much to be lamented that this statement is not given in plain terms, and the circumstances more accurately explained ; for my own part I cannot form any idea of a case where the loss of the limb is ultimately certain, in which the science of surgery can in the first instance determine that the life of the patient is in a state of safety. The most important danger under such circumstances is mortification, and if mortification once takes place, it is impossible for any one to determine where or when that will terminate.

But Mr. I. Hunter never mentions mortification ; it is inflammation alone which in this chapter is the subject of his consideration. Inflammation is certainly one of the first consequences of external injury ; but if inflammation does not end in mortification it will not prove mortal, and consequently this limitation of his observations to the inflammatory part of the disease appears to me to be a new refinement of Mr. I. Hunter's, which I am not able to explain.

\* I. Hunter on Gun-shot Wounds, page 560.

But



When treating of the time proper for the removing of incurable parts, he observes that "Perhaps it should not be done immediately upon the receiving of the injury, except where it is suspected that the inflammation in consequence of the accident will kill \*;" if he meant by terminating in mortification, why not express himself accordingly, as the two are without doubt very different kinds of disease. Certainly, if inflammation is cured, mortification is prevented, but I know of no other consequence of inflammation that, generally speaking, is likely to terminate in death; and this, I believe, is the first instance where amputation was recommended as a remedy for inflammation, and mortification was never mentioned.

The question of science in such cases is limited to a narrow compass, and it must appear evident, that all operations, from the extracting of a ball to the amputation of a limb, should either be performed before inflammation takes place, or deferred till all diseased action ceases. But on this subject we meet with no direction; I shall therefore proceed to examine how far his professional policy merits our attention.

On this occasion delay also seems to be the leading object; but whatever is right in a scientific view should, on all occasions, regulate our conduct as much as is consistent with the situation. But if the circumstances are such that the operations, which would otherwise be necessary, cannot be performed before inflammation has taken place, the dictates of science are that it must then be deferred until all diseased action has subsided; but if the state of the injury is of that degree to render death inevitable

\* I. Hunter on Gun-shot Wounds, page 559.

without a speedy amputation, it is then the surgeon's business to face all the difficulties with which he is surrounded.

It is said to be almost impossible for a surgeon, in many instances, to make himself master of a case so as to perform such a capital operation with propriety; but this will depend much on his abilities and address.

I have already given an instance of a case in a public hospital where there was time for deliberation, where one surgeon gave his opinion in opposition to another, in consequence of which the patient lost his life. It is not to be supposed that army surgeons will always be more free from errors than those who attend the hospitals; but whatever situation a man is placed in, he is to act to the best of his abilities, and whatever those difficulties may be, this does not alter the principles by which he is to regulate his conduct.

As for the operation itself I am happy in an opportunity of coinciding with Mr. Bell, who says, that it is an operation which any surgeon can get through with\*. Indeed it is a business so generally understood, that to make a difficulty of amputating a limb must be considered a reflection on the present state of surgery.

For my own part, it is only from description and conjecture that I can form an opinion of the field of battle; and though I am ready to acknowledge that I have never yet experienced either the glow of martial ardour, or the fear of a ball, yet I do not intend to establish any apology on the want of information, or plead ignorance of the nature of gun-shot wounds, the operations of surgery, or the method of cure.

\* Bell's system of Surgery, vol. 6, fifth edition, page 302.

It certainly is a question of considerable importance under what circumstances it may be advisable to amputate on the field of battle; but this is not the original question, our first object is to determine when any operation should be performed independent of such additional difficulties, and then to regulate our conduct as near as possible conformably to these rules.

One of the most urgent cases for immediate amputation is profuse hæmorrhage; and this is a case that admits of no delay, for if a large artery is divided, unless immediate assistance can be procured, the subject of the misfortune must speedily bleed to death. Under such circumstances, the tourniquet is certainly the first remedy; but if it is a large artery that is wounded, it will seldom happen that the application can be made with sufficient expedition.

We too frequently hear of cases of this kind occurring in private life; a melancholy instance happened in this neighbourhood a very few years ago, when a man was cut with a scythe by his own son, and bled to death on the spot for want of proper assistance. Another case I recollect, when a man would have bled to death, if a gentleman had not been present, who being acquainted with the tourniquet made a ligature with a handkerchief above the knee, and twisted it with a bit of wood similar to the twisted tourniquet.

In the field of battle, if the discharge is rapid and copious, it will be impossible to prevent the fatal consequences. But whether it is in private practice or in the field that such cases take place where the tourniquet is



applied in time, it will be here proper to observe that, the danger of bleeding to death having been fortunately prevented, the next object will be to complete the business by speedy amputation,

Suppose in private practice a very tight bandage should be applied, and a length of time pass before additional assistance was procured, the effects of the bandage would prove as certainly fatal, as the hæmorrhage for which it was applied; as this in a few hours would produce a degree of inflammation that would render the operation dangerous.

It may here be right to mention that it sometimes may occur, that if the degree of inflammation is such as to forbid the operation, it may be prudent to try the experiment, where the question remains doubtful, whether the consequent tension of the parts is not sufficient to prevent the discharge of blood. If on slackening the tourniquet the discharge should not be renewed, and the inflammation such as to render the success of the operation doubtful, it will then be right to defer amputation until the diseased action has subsided.

When I first read Drinkwater's history of the siege of Gibraltar, the account that he has given of the use of the tourniquet made a strong impression on my mind. But some years afterwards, at a time when I only retained an imperfect recollection from whence the idea first originated, I had formed an opinion that the tourniquet was in general use in all military establishments. For the purpose of obtaining satisfactory information on a question so particularly interesting, and so intimately connected with the subject before us, I made diligent inquiry of all the officers  
and

and other military men, whenever opportunities occurred, and was sorry to find that it is not in more general use, as there cannot remain a single doubt but that the lives of many useful members of society might be saved by the timely application of this instrument.

But I shall proceed to examine the subject as it rests at present in the hands of the surgeons; let us suppose after a bloody conflict, when the fate of the day is decided and the surgeons left in possession of the field, that on their first survey their first object will be to oppose the victorious hand of death by rescuing the wounded from the slow progress of his lingering powers.

For this purpose, when an injury has happened to an extremity and the tourniquet is applied to stop any further discharge of blood, if the number should be considerable on which the tourniquet is applied, it would take a considerable time to perform the operation of amputation upon all. If then all these are to be removed from the field before the operations are performed, it is probable that the distance of time will be great, and the inflammation so considerable as to prevent the operation being performed with safety. It is from this circumstance I am apprehensive that early amputation so often fails, as it is probable that in many instances it is not sufficiently early, and not undertaken until the inflammation has made considerable progress.

On this occasion it may be necessary to observe, that much will depend on the judicious use of the tourniquet, whether it is screwed so tight as if it was intended to twist the limb in two, or whether the tension is only sufficient

sufficient to stop the discharge of blood. It would not be a matter of astonishment if this business was ill conducted by uninstructed hands; but I am apprehensive that, in situations where there is time for deliberation, and under the direction of a professional hand, it is the custom to apply the tourniquet ten times tighter than necessary.

As a proof of this assertion, let those, who attend to the manner of conducting this formidable operation under the management of surgeons of the first abilities, observe that, when the person who manages the tourniquet slackens the bandage for the purpose of shewing the situation of the arteries, he will relax the instrument several turns before any discharge of blood will appear; whereas, if it was only sufficiently tight and no more, a single turn would be sufficient for the purpose.

I do not recollect that I ever was witness to an instance where the ligature was torn in two; but from the manner in which this instrument is frequently made use of, I think it is possible that accidents of that kind may sometimes take place, and to guard against the consequences of such misfortunes, we are advised to have two ligatures\*; but one will always be sufficient when this instrument is properly applied.

\* When we use the common tourniquet and ligature, I think it may not be amiss, from an accident which happened in an operation wherein I was concerned, to affix two ligatures to the compress, one of which to be rolled up and pinned back upon it, to be in readiness should the other happen to break. I give this precaution, having been present when such an alarming circumstance happened in the operation, just when the *crural* artery was divided, which threw the operator into some confusion, but I soon made my handkerchief serve the purpose of another ligature. This accident which made an impression upon the minds of the spectators to our disadvantage, was owing to the inadvertence of the person employed to manage the tourniquet, in twisting the ligature too much; therefore, to obviate such an inconvenience, particular care is required in tying the ligature, so that very little more than one turn of the stick may straiten it sufficiently. This incident made me more attentive than ordinary ever after. Gooch on Surgery, vol. 2, page 338 et 339.

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When a ligature is applied above the elbow for the purpose of bleeding in the arm, it frequently happens that the artery is so compressed as to prevent the circulation of the blood through the arm; and this is a circumstance which every one, who has been accustomed to perform this operation, must repeatedly have observed. If then a ligature, which is so moderately tight as what is used for the purpose of bleeding, frequently stops the course of the blood through the arteries, the violent force that is generally made use of by the tourniquet must be unnecessary.

When a limb is to be amputated, the tightness of the ligature may not be of much consequence; but when this instrument is used in the field for the purpose of stopping the discharge of blood from a wounded limb that is to be amputated at a distant period, it is a circumstance of great importance that the ligature should not be screwed more tight than just what is necessary to stop the hæmorrhage; and this by a little care and observation may easily be accomplished, as the stopping of the discharge of blood from the wounded parts will prove a proper index to the regulation of the pressure.

On this occasion there can be no doubt whether the screw or twist tourniquet should be made use of; by the former the tightness of the bandage may be regulated with the greatest accuracy, and I have always considered the latter such a clumsy instrument, that it has long been a subject of astonishment to me why such an imperfect instrument should be retained in practice. If it is a matter of no importance whether the pressure is just sufficient or ten times more than necessary, and if the uncertainty and irregularity are marks of perfection, then the twist tourniquet will claim the preference.

These observations may by some be considered beneath the notice of men of science; but it is my opinion that those, who are not able to form an accurate judgement of inferior parts, will not be able to understand the subject at large; it is as improbable, as to suppose that a child, who does not know his letters, should be able to read. In conducting the different parts of the operation of amputation, it is likely that the management of the tourniquet will be looked upon as a subordinate department; and though this should fall to the lot of one who is supposed to be master of his profession, if he does not conduct this part of the business with propriety and address, he will embarrass the operation, and expose the narrow limits of his own abilities. Whereas, on the contrary, if he is perfectly acquainted with the subject, he will shew his knowledge and dexterity as much by a judicious management of a tourniquet, as the surgeon who commands the knife and performs the most important part of the operation.

At the same time it is of the utmost importance in a business of this kind, and will contribute greatly to the expedition, ease, and perfection of an operation, to have the inferior parts conducted by able assistants; and it certainly is a very criminal species of professional pride to refuse giving assistance on such occasions.

A man of good sense will never lose his own dignity by taking an inferior part under one of inferior abilities, and will not in the least degrade himself either in a professional view or in his individual capacity; but, on the contrary, it would rather prove a gratification to be sensible of the  
great

great advantages that both the surgeon and patient must derive from his assistance, and the propriety of his conduct must on such occasion always command attention and respect. It is impossible in any situation to display abilities without the possession of them, and it is equally improbable that a meritorious character should appear in action and his superiority remain concealed.

The advocates for the twist tourniquet may perhaps contend that it is less complicated in its construction, and much more easily applied.

I am willing to allow that the screw tourniquet is attended with some difficulties; and when the limb is so much injured that it is inconvenient to slip the ligature over the extremity, the fixing of the tourniquet may be attended with considerable difficulties, and occasion some unavoidable delay; but, in the field, the screw tourniquet is the only instrument that will answer the purpose.

These little imperfections might certainly be easily corrected; and if I was ambitious of exhibiting my mechanical abilities or of ornamenting my book with pictures, and adding one to the many instruments already invented, I should not neglect this favourable opportunity; but as every surgeon should be a mechanic, I shall leave the instrument itself in statu quo; and for fear I should be censured for noticing an imperfection without pointing out a remedy, I shall beg leave to mention an easy and expeditious method of applying the screw tourniquet without altering the construction.

The



The buckle is a very clumsy and inconvenient part of this instrument, and the fixing of the double strap with equal tightness is frequently attended with some difficulty; I do not mean to insinuate that these little difficulties are worthy of attention in the chamber, but every inconvenience should be guarded against that may create embarrassment in the field.

The remedy which I would propose on this occasion is, to furnish each side of the tourniquet with a separate strap, that, when the instrument is applied, these two straps may be passed round the limb and tied together with a fast knot. And if the knot is placed over the artery, and the pad afterwards slipped under it, any inconvenience that might be occasioned by the pressure of an uneven surface will be prevented, and if the pad is made hollow on the external surface for the purpose of receiving the knot, it will by this means be confined in its proper situation; and in my humble opinion the instrument may in this manner be applied with ease, expedition, and effect.

I shall not on this occasion enter into a tedious and uninteresting description of the operation of amputation, it is a subject that in a general view has been long exhausted. If I was to enter into this part of the subject, it would only serve to shew the repetition of invention, and expose the vanity and folly of mankind. It will be of very little importance to a man of real abilities, whether his knife is crooked or straight, whether the saw is with a bow or flat blade. The number of plasters, the height of the table, have all been calculated with scientific accuracy; but that I may give unquestionable evidence of my candour and liberality on this occasion, I will not even take upon myself to determine whether the  
operator

operator should stand on the inside of the limb or the out, or whether he use the saw with his right hand or his left; for as nature originally formed them both with equal powers, I consider every one at liberty to consult his own convenience, and use his own discretion.

But there are some few circumstances, connected with this operation, that in my opinion have not been fully discussed, or satisfactorily determined; and whatever will unnecessarily add to the process, or delay the execution, should be carefully avoided.

It may appear rather presumptuous for a country surgeon, whose experience is limited to private practice, to attempt to give his opinion on the method of performing operations; but as it is not impossible but those who do the most may think the least, and that a multiplicity of objects may sometimes lead the thinking mind into an erroneous path, or prevent the correction of wrong opinions when once formed, and as useful information is not confined to any situation in life, or knowledge made the monopoly of usurpation, the mind for ever free cannot want subjects for contemplation; and it is not impossible but the less the number of objects that are presented to our view, the more accurately they may be examined, and the more perfectly understood.

I am ready to allow that one great perfection of the present state of surgery is, the reduction of the instrumental part, though many have laboured to impede the progress of this improvement, and there cannot remain a single doubt but that the hand is the best instrument when it is adequate to the purpose. With this view I am happy to acknowledge

the propriety of Mr. Bell's opinion respecting the inutility of the fillet as a direction for the knife in amputation ; but the subsequent directions on this subject are less satisfactory. He advises the operator to follow the knife with his eye \*, for the purpose of directing its progress ; but I am apprehensive that, if we only follow the knife with the eye, we shall be too late in our observations, and we may perhaps find out our mistake when the mischief is done, but shall not by this method protect ourselves from error. The child, who had read Gay's Fables, would have expressed himself better on this occasion, if he had recollected that we are there informed "It is right that care should go before."

I have noticed this instance, for the purpose of shewing how great men too often bewilder themselves in the cloud with which they surround the object that they are attempting to explain. And in the present instance we find that the writers on surgery have also dealt in mystery ; like other learned teachers, who sometimes blind their pupils with the dust of science for fear they should see the works of nature in a better light than they before have placed them.

The principal improvements in the operation of amputation, that have taken place within this last century, are the tourniquet, ligature, and double incision ; these great outlines are certainly objects of the first importance, but the numerous and insignificant observations of subsequent commentators can only serve to create a mystery, and render a plain subject unintelligible. Mr. Bell has with great propriety ridiculed the

\* Bell's System of Surgery, vol. 6. page 341 et 360. fifth edition.



opinion of Mr. Alanson \*, who directs that the incision should be made obliquely upwards with a straight-edged knife. All these supposed improvements have originated on paper, and may serve to amuse some, and bewilder others, but I hope are never likely to incumber practice.

When a young man first begins life, with timid caution, conscious of his own inexperience, he will naturally wish to refresh his memory, and obtain all the assistance which the books of surgery will afford. On these occasions, such minute directions and multiplicity of instruments only load the mind; whereas those, who have a perfect knowledge of the first principles, will always act best when they venture to think for themselves.

The only attempt, that has been made to improve the use of the needle and ligature, has been by the introduction of the tenaculum. But if the advantages of this improvement were as great as some have imagined, I should have supposed that long ago the needle would have been laid aside, and the tenaculum brought into general use. At the time that I attended the hospitals, which is now more than twenty years ago, it seemed to be the fashion at some hospitals to use the needle, at others the tenaculum: it appeared to me to be more a question of prejudice and caprice, than sound judgement or conviction.

Mr. Bell directs that the femoral artery should first be taken up with the tenaculum; he says that the small branches should then be secured,

\* Bell's System of Surgery, vol. 6. page 369. fifth edition.

but

but whether by the needle or tenaculum seems doubtful. For my own part, I think the tenaculum much less convenient than the needle for small arteries; and I have heard of surgeons, who give a decided preference to this instrument, who have been much longer about an operation than if they had used the needle.

I hope it will not be thought that I would advise imprudent haste in performing an operation; deliberation and steadiness are certainly the strongest characteristics of professional accomplishments; it is not hasty execution which I am contending for, but I wish to point out every incumbrance that may embarrass the operator, or in any respect occasion unnecessary delay.

Great as are the advantages of the needle and ligature, every objection was raised against them that a blind prejudice could suggest; and the pressure of the ligature on the extremity of a divided nerve was supposed to be more dangerous than the cautery itself. The tenaculum was certainly well designed to obviate these objections; but, as it is not sanctioned with a uniformity of approbation, it still remains a question whether the needle and ligature were attended with those inconveniences that have frequently been laid to their charge.

Mr. Sharp, in his critical enquiry, has given a very accurate history of the introduction of the needle and ligature; and it is principally on account of one of his observations that I have been induced to enter into this discussion. He appeals to authorities, with which he seems to coincide, for the purpose of proving that ligatures on the nerves are very  
innocent.

innocent applications. It is a subject that is well worthy the attention of the public, and I am astonished that it has remained for fifty years unnoticed. But, as it is too extensive for the present occasion, I shall only copy Mr. Sharp's observation, and leave the reader to his meditations \*.

When we review the progress of the art of surgery for the last hundred and fifty years, and consider the general exertions that have been made by some of the brightest ornaments of the profession for the purpose of improving the operation of amputation, it must appear singular that a subject, so simple in its principles and so plain and self-evident, should not long ago have been brought to the summit of perfection. And in this enlightened age I suspect it will be looked upon as the height of presumption, if any one should vainly attempt to add a single improvement to the voluminous labours of their predecessors; except it will be considered an additional improvement to relieve the operator from a number of useless instruments which the modern systems have provided on this occasion.

\* The moment *Parey's* new Method was published, the Objection was started, not from Observations in Practice, but as they thought the palpable Reason of the thing: And yet so little do we understand the nature of this Subject, that to the Confusion of Theory it has been discover'd by the Operation for the Aneurism in the Bend of the Arm, that the great Nerve contiguous to the Artery may be tied not only without fatal Convulsions, but even any notable Inconvenience. It is an Accident hardly ever avoided, though indeed it is caution'd against by Surgical Writers: But whoever is desirous of knowing what Effects it produces, may read the Account of them in the *Bonon. Instit. Vol. II. Part II. Page 65.* where we have the Histories of the Dissections of these Parts in Patients who had undergone the Operation some Years before their Deaths, by *Valsalva*: And the Author of these Histories is so little intimidated by the danger of tying the Nerve, as to advise Surgeons not to embarrass themselves on this Article, but to finish the Operation with all suitable Expedition, and without any regard to a Precaution of so little Importance. Sharp's Critical Enquiry, page 292 et 293.



When the utility of an instrument is unquestionable, it is probable that we should meet with a uniformity of opinion ; but it seems to be the number, and not the perfection of the instrumental part of surgery, that is to command our approbation. For the purpose of drawing the integuments and muscles upwards, an instrument, called a retractor, made of leather was invented by Mr. Gooch, which he says he first used in the year one thousand seven hundred and thirty-nine.

This instrument was introduced into general practice soon after the method of amputating with a double incision, and was probably supposed to be an additional improvement. But the idea was not new, a similar instrument made of linen was used long before the double incision was invented. Wiseman says, "the Bones freed of the *Periosteum*, Guido proposes a linen Cloth, and *Hildanus* a kind of Purse, to be brought over the upper divided Flesh, to pull it upward, and make more way for the Saw. But I think that needless. The Flesh divided, the Parts separate enough of themselves, besides the Assistant's pulling up the muscular Flesh and Skin is sufficient \*.

Monro also mentions this part of the operation, and thinks with Wiseman that it is a useless incumbrance. He says, "Before *the Saw is to be applied*, a Piece of flit Linen is always ordered to be put round the Bone, wherewith the soft Parts may be drawn up and defended from the Teeth of the Saw. I have almost always seen one of two Inconveniencies happen from this Piece of Linen ; either the Surgeon applied his Saw so

\* Wiseman's Surgery, page 442. third edition.

close to it, that the Linen was engaged in the Teeth of the Saw, which made it impracticable for the Surgeon to go on in sawing, till it was disengaged; or else to shun this, he left too much of the Bone without the Flesh, with a greater Chance of a tedious Exfoliation, and a Certainty of a pyramidal Stump. This Linen ought either not to be applied, from the want of which I never saw any Inconvenience, or it ought not to be allowed to touch the Bone, that the Surgeon may be at liberty to apply his saw upon the Bone close enough to the Flesh \*."

If the interposition of a thin linen cloth was found inconvenient, a thick piece of leather must certainly be more so. When I attended the hospitals the leather retractor was used by some surgeons, but not by all; and if the advantages of this instrument were unquestionable, it certainly would have been sanctioned by universal approbation. In my opinion it is neither useful nor necessary, and only serves to embarrass the surgeon and prolong the operation. A leather retractor is certainly a greater incumbrance than a piece of linen, and I have known the operator saw through both bone and retractor at the same time.

Mr. Gooch, for the purpose of recommending his own inventions, observes that many methods had been proposed and tried for the purpose of preserving a sufficient quantity of flesh to cover the end of the bone in amputations above the knee, but without success†. But as the double incision was introduced into general practice before the invention

\* Medical Essays, vol 4. page 262. third edition.

† Gooch on Surgery, vol. 2. page 330. second edition.

of this leather retractor, not a question can remain but that the operation was brought to a state of perfection far beyond the representation that he has given on the subject. It is the business of these pretenders to a knowledge of the mechanical part of surgery to state imperfections and describe difficulties, for the purpose of displaying their abilities in the invention of instruments that have in general proved both inconvenient and unnecessary.

From the time that the double incision was made use of by Cheselden and Sharp, it has been the business of succeeding writers to rob the first authors of the merit of their discovery by the addition of some imaginary improvements, in consequence of which they attributed all the success to their own inventions. This leather retractor of Mr. Gooch continued for years without a rival, till Mr. Bell attempted an improvement by substituting two iron plates instead of leather; and thus we find, in the progress of improvements, the linen was first changed to leather, and now the leather is converted into iron. The latter will certainly not be in danger of clogging the saw teeth, or of being sawed in two, in the manner above-mentioned; but there are many obvious inconveniences which it is not necessary to mention. It is only in amputations above the knee where any instrument of this kind is thought necessary; and when we consider that the situation of the bone is nearly central, and that a sufficient quantity of integument and muscles may be preserved without any difficulty, we shall be perfectly satisfied respecting the merits of this instrument.

The



The cross-stitch is now so little used, that it ceases to be an object in the practice of surgery; but as it is mentioned by most writers, and as the origin of this practice has been erroneously attributed to Mr. Sharp, the subject may yet be considered not unworthy of our attention. Mr. Bell says "it was proposed by the late Mr. Sharp, in his Treatise on this Operation, to draw the teguments near together by stitches or pieces of tape passed through them, and tied across the stump: But the pain and inconvenience attending this was so great, that it never was generally practised; and Mr. Sharp himself at last desisted from it\*." And Mr. I. Hunter says "I think the difference between Mr. Sharp's cross-stitch, after amputation, as recommended in his Critical Enquiries, and Mr. Alison's practice, shews strongly the superiority of the sticking plaster (or dry future†;") from which it is evident that some method of this sort is still thought necessary.

Wiseman does not mention the dry suture, but expresses himself very much in favour of the cross-stitch ‡; and though he seems well acquaint-

\* Bell's System of Surgery, vol. 6. page 332, fifth edition.

† I. Hunter on Gun-shot Wounds, page 209.

‡ The next thing is the loosening the Ligature, and bringing the Lips close over the Stump. Then whether you should with a cross Stitch hold them so, or content yourself by Bandage as well as you can, is by some controverted. They that object against the former say, it causes Pain and Inflammation. So doth Bandage also: if it be made too freight. Therefore they should object against that also. The most that I have seen without the cross Stitch have the next dressing been broad Stumps, some of them with Lips turned outward by the Bandage; in the least of them the whole Stump hath been bare: Whereas in those in which I have made the cross Stitch, the Lips have been found close to the Bone at the next dressing, covering the great Vessels, and a third part or half of the Stump hath been well digested, and by the second dressing hath been near agglutinated so far as it lay under that Skin, and without Inflammation happily cured. Whereas the broad Stump is a certain sign of a long Cure, and commonly the death of the Patient. Wiseman's Surgery, page 443.

ed with the effects of inflammation in this instance, he considered the advantages superior to the danger; and describes his success as being somewhat similar to what at this day would be termed healing by the first intention. It was then a disputed point whether bandage or the cross-stitch should have the preference, so that the application of both was at that time well known, and consequently the cross-stitch could not with propriety be attributed to Mr. Sharp. But on this occasion it will be right to recollect, that the double incision was not known in Wiseman's time; and consequently such methods of bringing the parts together were more necessary; at the same time the inconveniences of this method of practice had been accurately noticed, and if subsequent writers had attended to what had been previously said on this subject, they would not have attributed to Mr. Sharp what after the invention of the double incision became unnecessary. And it must be evident that the revival and repetition of such instances of ancient practice have all depended on a want of attention to the historical progress of the profession.

It is not that I intend to examine the merits of the cross-stitch, or the preference that should be given to the dry suture; the question is whether they are not both improper, and that the only merit of either, to which we may give an approbation, is, by comparing the degrees of impropriety and giving the preference to that which is least prejudicial. I am well convinced that the inflammation subsequent to the amputation of a limb is frequently so considerable, that any kind of tight bandage either by ligature or plasters must be productive of certain danger; and as no advantages could arise from attempting to confine the parts by ligature or plaster, it would be creating a danger without any probability of advantage.

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The consequence of this inflammation is so well described by Mr. Sharp that I shall copy his own words. He says, "It must be confess'd however, that notwithstanding we derive such Benefits from the double Incision, the contractile Disposition of the Muscles, and perhaps of the Skin itself, is so great, that in spite of any Bandage they will retire from the Bone, especially in the Thigh, and sometimes render the Cure tedious. To remove this difficulty I have lately on some Occasions made use of the Cross-stitch \*." As a remedy for these difficulties he recommends the cross-stitch as an operation already known, but I wonder that a surgeon of such experience should not have been well convinced of the inefficacy and danger of the practice. He enumerates the inconveniences, and though his observations in general strongly militate against this method of practice, his opinion is ultimately given in its favour, and it is evident that his arguments were in direct opposition to his own conviction. But on what grounds Mr. Bell could assert that Mr. Sharp at last gave up the cross-stitch, I am at a loss to determine.

I remember this method was made use of by some of the surgeons when I attended the hospitals, but not by all; in consequence of which it soon became a question of consideration with me which method ought to be preferred. In the first place I considered that it gave additional pain to the patient, and prolonged the operation; and it frequently occasioned considerable trouble to the operator, and the appearances of the stump, when it was drawn together at four parts, gave me a very unfavourable opinion of the practice. If the inflammation is moderate, the gentle pressure of a linen roller carefully applied will be sufficient to keep the parts in a

Sharp's Critical Enquiry, page 266.

proper



proper situation; and if the inflammation is great, the cross-stitch will not be sufficient for the purpose, and at the same time the remedy will increase the disease.

The first operation that occurred in my own practice was succeeded by a considerable degree of inflammation, by which the integuments and muscles were so much retracted that I began to be very much dissatisfied with my own abilities as an operator, and considered myself guilty of a great omission by neglecting the cross-stitch. But the inflammation in a few days subsided, and furnished me with a satisfactory illustration of the process of nature on such occasions. If two pieces of sticking plaster are drawn across the stump, they will occasion the same deformity of appearances as the cross-stitch; and if the ends of the plasters are continued for some length up the stump and confined by a roller, their pressure will also prove prejudicial; but in this instance we shall avoid the pain occasioned by the four wounds with a broad seton needle, and the irritating pressure of the ligatures on these inflamed and tender surfaces, and this method will consequently prove preferable to the cross-stitch, but I do not admit that this is necessary.

If Mr. Bell considers the use of the dry future\* a new discovery and improvement of his own, I should beg leave to remind him that Mr. Gooch recommended a similar practice† more than thirty years ago. But so far from any of these pretended discoveries being new, Wiseman

\* Bell's System of Surgery, vol. 6. page 345. fifth edition.

† Gooch on Surgery, vol. 2, page 332, fifth edition.

has expressed himself fully on many parts of this subject, and seems justly apprehensive of their dangerous consequences. If Mr. Bell thought proper to copy Mr. Gooch in one instance, he should not, when he was treating of a similar subject, have let other parts pass unnoticed. When we are convinced that any subsequent writer has read a book, if he recommends a similar practice, he is certainly liable to be accused either of plagiarism or inattention.

I am well convinced of the great improvements that have ornamented modern surgery, and am ready to acknowledge the abilities of those authors who have so liberally contributed to the advancement of the profession, and whose works I have taken the liberty to examine. But every candid judge, who has paid critical attention to this subject, must be well convinced of the want of argumentative connection and scientific uniformity. If ever we may expect to see a system of surgery on a philosophical basis, the different parts must all be arranged in a regular succession, each respective subject must be traced back to its proper origin, and by this means we shall be enabled to trace the progress of improvements and form an arrangement of facts in scientific order. Systematic arrangement requires regularity and connection, and is the direct opposite to miscellaneous confusion.

It has already been observed that amputation is a simple operation which is not difficult to be performed; and if we had any settled plan of operating, the whole might be learned mechanically, as much so as any other mechanical operation: and yet we find the united wisdom of the last century has not been sufficient to establish a regular system of practice;

tice; and our knowledge of this subject must remain extremely imperfect, if it is not founded on scientific principles.

There are other operations in surgery that are supposed to be attended with greater difficulties; but, in my opinion, a knowledge both of the scientific and mechanical parts of surgery is equally applicable to all.

Perhaps cutting for the stone (which has in general been looked upon as one of the first operations in surgery) will be considered an exception to this general rule; and I am ready to acknowledge that there are few operations that are more perfectly mechanical; but in this instance it will be necessary to be acquainted with the anatomy of the parts, which is the only scientific object that is connected with this operation; for this is a subject that is not in general connected with disease. The whole business is to make an opening through parts that are in a state of health, and extract a hard substance from an inward cavity that produces distressing consequences by the effects of mechanical pressure. From which it must be evident that, independent of a knowledge of surgical diseases, a lithotomist may perform this operation with safety, dexterity, and address; and as the healing of the wound is an operation of nature, and requires very little assistance from art, I think it is very possible that the reputation of an accomplished lithotomist may be obtained, independent of a knowledge of the first principles of surgery. But if inflammation or any other unexpected accident should take place, the operation will ultimately fail for want of scientific information.

The most difficult cases that occur in the practice of surgery, are where the operation is connected with a state of disease. There are two instances

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ces of this kind that particularly merit our attention, in which operations may be unnecessarily performed, the patient ultimately do well, and the error not detected. As the operation for the bubonocoele is made use of as a remedy for mortification, I shall first attempt to point out the difficulty of determining when this operation becomes necessary.

When we consider that all these subjects have been so repeatedly discussed by writers of the first abilities, it may at first view appear both presumptuous and unnecessary to make any additional observations. Before the anatomy of the parts was generally known, a critical explanation of that part of the subject was well worthy the attention of the public; but the anatomical writers have in general confined their views to the form, connection, and structure of the parts, and their observations are too much limited to the mechanical part of the subject; and though anatomy and physiology are supposed to go hand in hand, we seldom find that much attention has been paid to the first principles of the vital powers, or that the nature and progress of morbid actions have had a due share of attention.

The mechanical parts of the subject are less difficult of investigation, and with propriety become the first object of our attention. But the dissection of a dead body, let it be ever so accurately performed, will not of itself be sufficient to give us clear ideas of the first principles of disease, or lead us to a rational method of cure. If I should be accused of only taking a partial and imperfect view of some collateral objects that naturally present themselves on this occasion, I shall beg leave to answer that it was not my intention to write a system of surgery, but rather to point out

out and explain such parts of the subject as seem to have escaped the notice of my predecessors. What I contend for is, that there is much less difficulty in performing an operation than judging with critical accuracy when it should take place.

In the present instance it is a subject on which it is impossible to decide with certainty. For in all those cases of hernia, where mortification does take place, it must be evident that the operation was too long delayed; but in all those cases, where the operation is performed previous to the commencement of mortification, it will be impossible to determine with certainty that the operation was absolutely necessary, except in such instances where adhesion had taken place and reduction was impossible.

Let us suppose that bleeding, cathartic glysters, the warm bath, and purgative medicines, had all been made use of to no purpose; and, in addition to these remedies, let us suppose that every rational attempt had been made by the hand of the surgeon to promote reduction. - We will suppose further that the injection of tobacco-smoke had been made use of per anum, and that a whole ounce of tobacco had been consumed on this occasion without the least perceptible advantage; it would even under such circumstances be wrong to conclude, that the hernia was irreducible and that the operation was the last resource we had to flee to; for Mr. Pott mentions a case where all this was done without success. But he informs us that the injection was still continued, and that the consumption of two ounces produced the desired effect. The case is short and abounds with instructive information; and, as it comes from high authority, I shall give it as evidence of the difficulty of forming an opinion  
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with any degree of certainty in such cases \*. It would be the height of presumption to say that reduction was impossible, or that some other additional treatment might not relax the stricture. It would be impossible to say how far bleeding might be carried in such cases, or whether tobacco-glysters had been used to their full extent; and the number of instances, where the operation has been determined upon and reduction afterwards taken place, too fully proves the truth of this assertion.

The most accomplished surgeon that ever attempted to reduce an hernia may try in vain, if there is not the most fortunate concurrence of circumstances in his favour. The position of the patient and his united efforts are circumstances that cannot always be commanded; and not only the position of his body, but the state of his mind, may frequently contri-

\* I was desired to visit a ruptured patient with Mr James, then surgeon to St Luke's hospital.

The patient was a stout healthy man, about thirty; the rupture was large, hard, painful, and beginning to be inflamed on the outside; no stool had passed for two days; the man had great pain all over his belly, and a frequent vomiting. Mr James had many times tried to reduce it; he had bled him freely, and had given both purges and glysters, but all without effect.

The scrotum was exceedingly tense, and the pain which attended the most gentle handling was so exquisite, as not only to render all attempts for reduction by the hand improper, but hazardous.

It was about noon when I saw the man: every thing, except the tobacco, had been tried; the symptoms were advancing hastily, and the operation was proposed and submitted to; but while our things were getting ready, we thought we might as well try the smoke-glyster.

One ounce of tobacco was expended without any effect at all, either general or local; but toward the consumption of another, the patient became sick and faint, and complained of a strange kind of motion in his belly, and also in his rupture. Upon turning the bed-clothes back, the motion was not only to be felt within the scrotum, but was even visible; this motion continued about two minutes, when the intestine, without being touched, returned; the man became immediately easy; and in half an hour, had a plentiful discharge per anum. Pott's Remarks and Observations on Ruptures, page 98.



bute in a great degree to promote success. Every judicious method may be made use of and the best directed efforts tried in vain, and the operation may be determined upon ; in consequence of which, apprehension and despair may seize the patient's mind, general relaxation may take place, and under these circumstances the hernia be returned.

If the operation is determined upon in an early stage of the disease, the whole business of the surgeon is to open the hernial sac, divide the tendon of the obliquus muscle, and return the obtruded parts into their natural situation. This is a little operation, and the subsequent success will seldom fail to give satisfaction to the patient, and promote the reputation of the operator.

But if mortification has taken place, and the contents of the hernia become diseased, it then forms one of the most critical subjects that can engage a surgeon's attention. The time for deliberation is then but short, and the conducting of the operation must depend alone on the abilities and address of the operator, and the most accurate discernment and prompt decision will then become necessary. The intrusion of any additional opinion would only create embarrassment and increase the difficulties, and it would be impossible in this momentous crisis to retire for consultation. In such cases it is impossible to anticipate the extent of the operation, it must depend on the degree and extent of the disease, and all these decisions must rest on the judgment of the operator.

In cases of hernia, attended with inflammation, the object of the operator is to remove the stricture, by which the intestine and other contents are

are set at liberty, and mortification prevented. When inflammation takes place in the extremities, whether in consequence of external injury or other causes, if there is reason to be apprehensive of mortification, it has been repeatedly urged in the preceding pages that any operation during the progress of the inflammation would increase the danger. But in cases of hernia with stricture, it is the mortification of the internal parts which constitutes the danger; whereas the external parts are the subject of the operation, for which reason the same objections to the operation do not apply on this occasion.

From what has already been said on the subject it must appear evident, that a mechanical knowledge of the operations of surgery will not alone prove adequate to our purpose. There are very few instances in which a knowledge of scientific principles is more necessary than in cases of external injury of the head. The removing of the scalp, the scraping off the pericranium, the application of the trepan, and the use of the elevator, are very humble parts of the business, a knowledge of which is easily to be obtained. But to form an accurate judgement of the extent and degree of injury, and to determine what remedies will be necessary, are questions attended with more difficulty than the public in general are aware of. If we consider this operation in a mechanical point of view, it is evidently a subject of no very great importance; and as the surgeon is certain to protect his professional reputation by making a perforation in the patient's skull, it is no wonder that the operation is so frequently performed. I have already given an instance where my own conduct was called in question, because I would not do more than I was convinced was necessary; and so great are the prejudices of  
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the public on this occasion, that the surgeon's abilities are in general estimated by the extent of the operation. But this is not merely a question of professional policy, it will be found to be a subject of great practical importance. The facility with which an unlearned operator may remove a portion of the scalp, and make a perforation with the trepan through any part of the skull where there is no inequality in the thickness of the bone, may sometimes prove a recommendation to this operation in cases where it is unnecessary: but to form a critical opinion of the degree and extent of the injury, and to determine under all circumstances where the trepan may be applied with the least hazard, and the greatest probability of success, not only requires an accurate knowledge of the anatomy of the parts, but it will be also necessary to form an opinion of the degree and extent of the disease, and for this purpose to estimate the effects of inflammation on the integuments, on the bones, on the membranes, and on the brain.

From this view of the subject we shall be led to the consideration of the same principle that has already been pointed out as an important object in the scientific department of the operations of surgery. And as I am apprehensive that the progress of inflammation, in cases of wounds, contusions, and fractures of the skull, is a subject that has in general passed unnoticed, for that reason it becomes an object more deserving our attention. It frequently happens in very extensive injuries of this kind that large portions of the integuments will slough away, that the parts of the skull will die, and be removed by a tedious process of exfoliation, and all this will be attended with inflammation. And though the degree of inflammation in some instances may be inconsiderable, yet the degree of injury and the consequences will always bear  
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a certain proportion to each other. If on this occasion I should be accused of creating imaginary difficulties, or magnifying insignificant dangers that may by some be considered unworthy of attention, I shall beg leave to advise those, who are of a contrary opinion, to pay more critical attention to the evidence of their own practice; as the advantages of early decision, and the danger of operating after inflammation has taken place, are as evident in cases of fractures of the skull, as they are in other instances of compound fracture.

I do not pretend to assert, that, if an ignorant surgeon had in the first instance not traced the injury to its full extent, but had left a depression of the fractured skull still resting on the brain, if under such circumstances inflammation had taken place, any additional operation might not be performed with safety and advantage. I only wish to observe, that the diseased state of the parts would increase the danger; and if there had been any omission in the first instance, the necessity of any additional operation should be rendered unquestionable before it was undertaken.

In many formidable cases of injury to the head, the brain is generally so much affected that the patient is not capable of giving an account of his own situation; and it frequently happens in cases of concussion of the brain, without the least apparent injury either to the integument or skull, that all the mental faculties will be suspended for a length of time, and yet the patient ultimately do well. In cases where the skull is fractured it will be right to trace the injury to its full extent; But what I contend for is that, whatever operation may be thought necessary, it should be performed before inflammation has taken place. It would be a very difficult

question to explain the kind and degree of sympathy that takes place between the brain and the external parts of the head under different circumstances; but if the subject does not admit of a full investigation, our knowledge of the pathology of the nervous system is sufficient to enable us to determine that the inflammation of the brain (which is the fountain of sensation) is likely to be productive of the most dangerous consequences.

I have mentioned these circumstances for the purpose of illustrating the necessity of paying more strict attention to the pathological part of these subjects, as it appears to me to be a part of the science of surgery that has in general passed unnoticed. It is not my intention to enter into a critical examination of all the operations of surgery, I only wish to shew that one scientific principle may be carried through the whole. But it is not by the investigation of a single principle that we must expect to establish a complete system of surgical pathology.

It seems to have long been the general opinion of hospital surgeons in Town, that patients in strong health do not so frequently recover after amputation as those who are sunk by previous disease. But this opinion appears to me so truly paradoxical, that, notwithstanding the high authority with which it is sanctioned, I cannot think that it is well founded; and if the fact is, as here stated, in the London hospitals, it does not equally apply to patients in other situations. But there seems to be considerable inaccuracy in the arguments which are made use of on this subject, and I shall beg leave to suspend my assent to this opinion till I meet with more satisfactory evidence. Mr. I. Hunter asserts that "few people in full health

health are in a fit state to bear amputation\*;" but this opinion appears to me to want rational protection. For my own part I cannot see any reason why a person in full health and vigour should not support the loss of a limb better than after being reduced by a long and lingering disease. The inflammation subsequent to amputation is not likely to produce dangerous symptoms except it terminates in mortification, and I believe that is a circumstance which will very rarely happen if the operation is performed sufficiently early; but if inflammation has taken place in consequence of the injury, the state of the question is then altered, and the operation is certainly improper.

But Mr. I. Hunter also urges the loss of blood as an objection, which appears to me to be an argument against his own opinion; for if strong health is considered a reasonable objection in one instance, the loss of blood† which would reduce the state of the constitution to a lower standard must certainly be advantageous; and this argument must be considered the perfection of medical obscurity, to urge a state of full health and vigour, and an exhausted state of the constitution in consequence of a loss of blood, as similar objections against the propriety of amputation. But such are the arguments that are brought forwards for the exquisite gratification of propagating these sublime productions, and the establishment of doctrines that are only calculated to add darkness to the unintelligible mysteries of the profession.

\* I. Hunter on Gun-shot Wounds, page 560.

† In the first case, it is only inflammation: in the second, it is inflammation, loss of substance, and most probably loss of more blood, as it is to be supposed that a good deal has been lost from the accident, not to mention the awkward manner in which it must be done. I. Hunter on Gun-shot Wounds, page 592.



I well remember an instance that occurred, whilst I was attending the hospitals, of a man in perfect health being admitted for an aneurism in the popliteal artery. On examination of the parts, it was the united opinion of all the surgeons present that the operation for the aneurism would not succeed, and the limb was immediately amputated about the middle of the thigh. I repeatedly saw the patient dressed for the first fortnight, during which time all went on well, and the last time I saw him the discharge was moderate and the appearances perfectly healthy. From this time I ceased to attend the dressing of this patient, thinking his recovery certain, and that no occurrence could afterwards take place worthy my attention. But in less than another fortnight after, I heard that he was dead. This termination could not depend on the excess of the first inflammation, or his high health previous to the operation; perhaps it may at this distance of time be presumptuous in me to assign a cause; but, if there is any additional danger attending early amputation, I shall contend that it is limited to the hospitals and does not extend to general practice.

When a patient has long been confined to an hospital he becomes accustomed to its regimen, the mind also becomes reconciled to the situation, and the constitution to the air and manner of living; and to the indigent, who have suffered under long and painful disease, it will frequently prove a change from misery and want to what to them will appear a situation of ease, luxury, and unexpected happiness; the same situation, that may be considered a palace by one man, may be looked upon as a loathsome prison by another. But to those who enter an hospital in consequence of some accident, or for causes above stated,  
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in other respects in full health and vigour, the change may have a contrary effect both on the mind and constitution, and the powers both of body and mind may sink under the united influence of the operation and situation, that would survive the operation under different circumstances. I have been induced to make these observations for the purpose of accounting for an opinion which I still suspect is founded in error; but if it does happen that people in full health and vigour do more frequently sink under the operation of amputation in the hospitals, I wish to shew that it may depend on local circumstances, and that the want of success is not to be attributed to the state of the constitution.

There is one more argument urged against the propriety of early amputation, particularly on the field of battle, which it is necessary to reply to. The state of the patient's mind is supposed to be unfit for such a conflict. As this is a question of some importance, that I may in this last instance avoid all suspicion of misrepresentation, I shall give an exact quotation. Mr. I. Hunter says "the situation they are in at the time from the hurry of mind, makes it here in general to be the very worst practice; it will in general, therefore, be much better to wait till the inflammation, and all the effects of both the irritation and inflammation, shall be gone off\*." And "If the chances are so even, where common circumstances in life favour the amputation, how must it be where they do not? how must it be with a man, whose mind is in the height of agitation, arising from fatigue,

\* I. Hunter on Gun-shot wounds, page 560.

fear, distress, etc. ? These circumstances must add greatly to the consequent mischief, and cast the balance much in favour of forbearance. §”

In all cases of violent injury of the extremities to such a degree as inevitably renders amputation a necessary remedy, the pain of body and apprehension of mind place the whole system in a state of active exertion ; and whatever may be the situation of parties, I think it is reasonable to conclude that the state of the mind will bear some proportion to the nature of the injury, the degree of danger, and excess of pain. And as the field of battle is a situation that calls for great exertions, it is probable that intrepid fortitude will here be raised to the highest pitch ; it would be a reflection on the soldier's character, a stain on martial heroism, at such a time to fall a slave to fear. If then it is reasonable to conclude that in the field of battle the exertions must bear some proportion to the danger, by immediate amputation the body is relieved from pain and the mind from fear : The question is at once decided, and the complicated danger reduced to a simple case in surgery. By early amputation there is only one inflammation, by delay there is the inflammation in consequence of the injury, and after a tedious interval of disease we have still to meet the dangerous consequences of the operation. The body suffers under pain, the mind becomes subdued by a continued state of danger, and the patient sinks under delay, protracted pain, long confinement, and weeks of apprehension.

§ I. Hunter on Gun-shot wounds, page 562.

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If amputation is immediately performed, the dreadful expectation of a painful operation is put an end to before the mind sinks from its exertion. Fear unobserved retires, and cordial hope with reanimating influence recalls the vital powers, and supports the patient through the subsequent disease. But if the operation is delayed, the mind is left in a state of constant apprehension, and his best expectations only promise a recovery from one danger as preparatory to a painful operation, which is to deprive him of his limb, and to which his life may still fall a sacrifice. But if the operation is immediately performed, let us appeal to those who have ever experienced the fear of pain, and the dread of approaching danger, and contrast this with confidence in a state of safety, and the rational hope of recovery, and then decide the question ; and I have no doubt but an opinion will be given against protracted danger.

Since the time that this subject first engaged my attention, an opportunity occurred which enabled me to procure some satisfactory evidence on the point in question. I was sent for to a young man, who was previously in good health, whose hand and part of his arm were blown to pieces by the bursting of a gun; I proceeded to amputation with all possible expedition ; and though the place where the accident happened was about three miles from the town where we both resided, the operation was performed and he afterwards returned with me in the chaise and was safe in his bed in about three hours from the time when the accident took place.

As we returned in the chaise together I conversed with him on this subject, and enquired with critical attention whether it was not a great

great consolation to him that the pain and anxiety were over; I think it scarcely necessary to mention that he expressed the greatest satisfaction that he had got through the difficulties of the operation; and he considered himself in a much better state to undertake the journey than if he had been encumbered with a lacerated hand and fractured arm; and acknowledged that the operation had contributed much to his relief from pain both of body and mind.

Indeed it is a question so plain and self-evident, that I should not have thought it worthy of attention, if Mr. I. Hunter had not placed it in such a conspicuous point of view. The example which I have brought forward may perhaps be considered either inapplicable or inadequate; but that I may shew whose experience was the most ample and satisfactory, I shall now examine the opinion of Wiseman on this subject.

Wiseman has described what he had been witness to and what he had seen in actual service, but the representations of Mr. I. Hunter are the visionary conjectures of a bewildered imagination.

The former gives plain matters of fact and describes some very interesting scenes in which he himself had been one of the principal actors, and his observations want no comment; his language is expressive of the true spirit of fighting; and the simplicity of his narrative displays the pure enthusiasm of nature, and gives us an idea of martial heroism far beyond the most sublime display of high poetic fiction. Milton has described his immortal heroes waging war in heaven.



ven. But Wiseman, his contemporary, limits his views to what he has seen on earth, and with all the simplicity of nature tells the simple truth, in which he represents the mutilated warrior, unawed by fear, insensible of pain, rushing from the hands of his surgeon to renew the contest.\*

This then is the time for amputation when the mind is prepared for difficulties and dangers, and the loss of a limb must be considered an object of inferior importance when life has been at stake.

\*A *Scottish* Soldier was brought to me out of the Field at the Battle of *Worcester*, shot with a Musket bullet into the Elbow-joint, which fractured not only the ends of the *Radius* and *Ulna*, but likewise that of the *Adjutorium*. Upon fight whereof I called *Will. Clarke* (now a Chirurgeon at *Bridgenorth*) and other my Servants about me, to cut off the Arm, and the while I endeavoured to encourage the Soldier to endure it. In answer thereto he only cry'd, *Give me Drink, and I will die*. They did give him drink, and he made good his promise and died soon after; yet had no other Wound than that. By which may be perceived the Danger in delaying this Work to the next day, when the aforesaid Accidents have kept them watching all night, and totally debilitated their Spirits. Which happens not, if it be done in Heat of fight, for then, while they are surprized and as it were amazed with the Accident, the Limb is taken off much easier: and if it be the Arm, some of them will scarce be kept in the Hold while the Ship is close engaged in Fight. In the heat of Fight I cut off a Man's Arm, and after he was laid down, the Fight growing hotter, he ran up, and helpt to traverse a Gun. And a *Walloon* earnestly begged of me to cut off his shattered Leg: which whilst I was doing, he cried, *Depeche vous connous vendrone à terre nous biron*. Also others have urged me to dismember their shattered Limbs at such a time, when the next day they have profess'd rather to die. But amongst us aboard in that service it was counted a great shame to the Chirurgeon, if that Operation were left to be done the next day, when Symptoms were upon the Patient, and he spent with Watchings, &c. Therefore you are to consider well the member, and if you have no probable hope of Sanation, cut it off quickly, while the Soldier is heated and in mettle. But if there be hopes of Cure, proceed rationally to a right and methodical Healing of such Wounds; it being more for your Credit to save one Member, than to cut off many. Wiseman's Surgery, page 410.



He, who, just before, had "set his life upon a cast, and dar'd to stand the hazard of the dye," will certainly not fear to lose a limb; and, who, but a few hours ago, had faced the enemy's destructive sword, can never dread the surgeon's friendly knife. But if the operation is delayed, the mind becomes exhausted, and dejection and despair take place; and every cause of apprehension tends to increase the danger. With respect to the state of the body, sufficient has been said already in favour of early amputation, fully to determine the point in question; and it may be considered a happy circumstance on this occasion, that the friendly influence both of body and mind do so perfectly coincide.

And as no one, who enters into an engagement and boldly braves the danger of the field, can be certain to return with safety; it must unquestionably prove a protection against the influence of apprehension, to be previously convinced that every assistance will be given which the nature of their misfortunes will admit of, or the art of surgery can bestow. I shall, therefore, in behalf of the honour of the profession, whose real dignity I wish on all occasions to support, beg leave to observe, that a confidence of receiving every friendly assistance from the hands of the surgeon may be admitted as a consolation that may serve to animate the soldier's heart. It certainly must contribute to the satisfaction of all parties to have every doubtful question previously determined, and to have it known that, when amputation is necessary, delay and safety are incompatible with each other. It is a question of great importance in private practice, but in a public situation it is an object of inestimable extent. It is not only the happiness of the patient and the reputation of the surgeon that may be at stake; but the fate of nations and the prosperity of the world may, at some future period, be involved in the decision.

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But whether it is in a private or public situation, the duty of the surgeon is the same; and let us hope that no inducement will be wanting, if he considers that, whether he is acting in the calm of private life and administering the balm of domestic comfort, or is engaged in the busy scenes which his duty to the public may require, at the same time that he is adding splendour to his own professional character, he is alleviating the unavoidable misfortunes of human nature, and whilst he is promoting the dignity of his profession, he is contributing to the happiness of mankind.

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Vive, vale : siquid novisti rectius istis,  
Candidus imperti, si non, his utere mecum.

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